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SIXTY-NINTH YEAR



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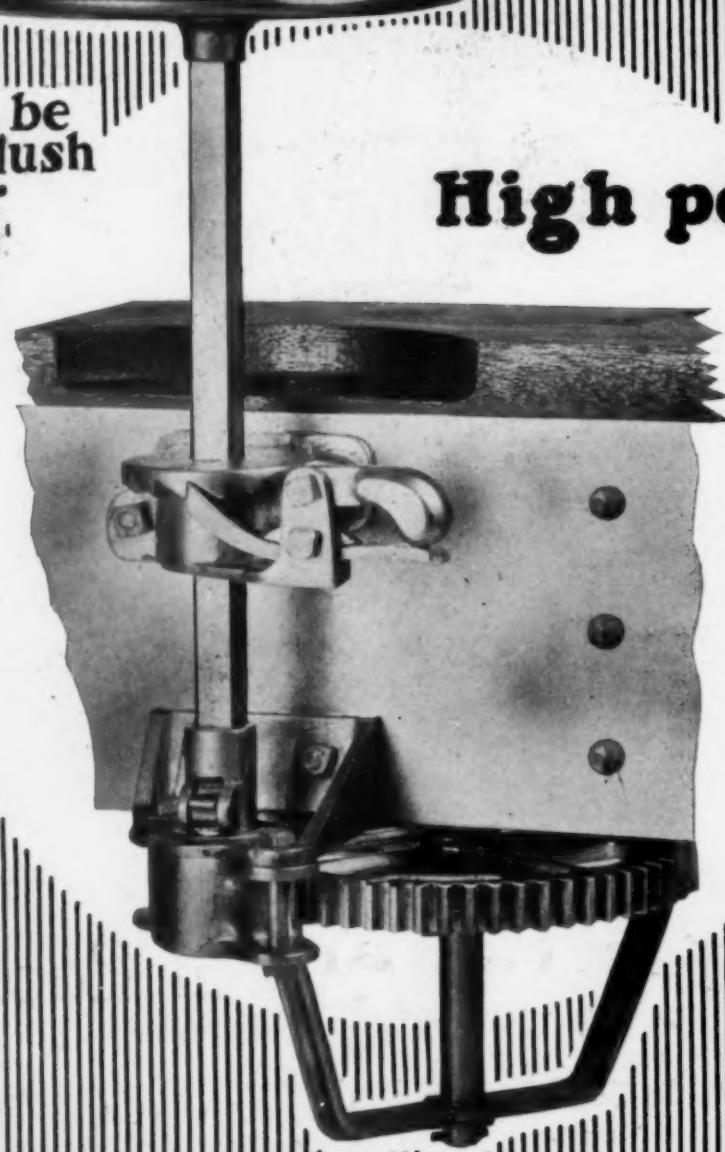
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EDITORIAL



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Louisiana has a railroad-crossing stop law for automobiles, to go into effect on the first day of November; but it looks

Crossing-Stop Law in Louisiana as though it has been adopted without much intelligent discussion. It is not to apply in any city or town of 10,000 inhabitants or more, nor where a gate or a flagman indicates that it will be

safe to cross. The act (approved June 27) also includes the ordinary time-honored sign law, but does not provide for the cautionary sign board, 300 ft. from the crossing, which has been so widely adopted in other states. This and other omissions and crudities indicate that the Louisiana legislators took little care to avail themselves of the detailed and comprehensive study of the crossing problem which could be found in the proceedings of railroad commissioners' conventions and in other publications. There is no evidence, indeed, that information was sought even from those states which, like North Carolina, have experimented with stop laws during the past year or two. Our legislatures are (or normally should be) our primary sources of wisdom in matters of this kind; but legislators seem often to be content to stay in the primary grade perpetually. The next Louisiana legislature ought to tackle this subject again. To improve conditions at crossings by means of a stop law is a difficult and evasive problem at best, and it is time that more practical and energetic attention were given to it.

According to figures compiled by the Committee on Statistics of the Safety Section of the American Railway Association,

Safety Work Pays	2,550 employees were killed on the railroads of the United States in 1900. In 1923 this figure was reduced to 1,866 in spite of an increase of approximately 46 per cent in the number of employees.
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During this same period, however, the number of employees injured increased from 39,643 to 148,146, and while many of the injuries in the latter year were doubtless of minor importance the aggregate cost to the railroads and their employees through loss of time, medical attention, etc., was tremendous. There is therefore still need for tireless effort on the part of railroad safety committees in an attempt to reduce the number of railroad employees killed and injured annually. In addressing the Safety Section at its fourth annual meeting in Salt Lake City recently, Carl Gray, president of the Union Pacific, said, "The foundation work of a safety organization is of paramount importance. The work will not flourish under haphazard or catch-as-catch-can methods. At the beginning some very definite ideas and aims must be shaped into a program and the officers and men must be fully advised of the endeavor as well as be impressed with its importance. Distinction is made between the officers and men for the reason that we recognize the fact that these employees, commonly referred to as 'the men' in a large degree follow the example set by their officers, and the degree of interest which will be displayed in the work by the men who are our real safety evangelists will be determined by the interest which is evinced by their officers." Mr. Gray credited effective organization work with being largely responsible for the reduction in accidents on the Union Pacific.

The reportable casualties on that road in 1915 numbered 7.72 per 100 employees, and this figure was reduced to 1.36 per 100 employees in 1923. In the *Railway Age* of August 16, H. M. Mayo, superintendent of safety of the Southern Pacific, called attention to some interesting figures regarding casualties among shop forces on that road. According to his records, the repair shops at El Paso, Texas, employing about 1,000 men, were operated for seven months with the expenditure of 1,079,526 man hours of labor, with but a single reportable accident. The Algiers, La., shops of this road did almost as well with three reportable injuries in a period of six months, representing 1,315,477 man hours of labor. This is eloquent testimony to the effectiveness of the "unremitting campaign against carelessness and for the cultivation of safe practices" being carried on by the Southern Pacific.

The Long Island is seeking an increase of 20 per cent in its rates for commutation tickets and the usual protest on the

How Not to Improve Suburban Service part of some of its patrons, urged on by local politicians, has resulted. Fortunately for justice, the decision in the case rests with the public utilities commissioners and not with the public un-

der its present political leadership supported by the editorial attitude of certain widely-read newspapers. A favorite form of argument against the proposed increase has been a comparison of rates on the Long Island with rates to points of similar distance from New York on other roads. This comparison strikes the unthinking as obviously fair, but it is not; the roads whose rates are compared with those of the Long Island are for the most part steam roads which do not enter Manhattan Island at all, whereas the Long Island is electrified throughout the most heavily congested areas which it serves and, moreover, it brings its passengers either to the heart of Manhattan or to the heart of Brooklyn. Commuters using most of the roads with the rates of which those of the Long Island are unfavorably compared are carried only to the New Jersey side of the Hudson on their suburban trains. To reach Manhattan they must either travel by ferry, which does not put them down in the heart of the city, but only at the water's edge, or they must finish their journey by the Hudson tunnels, paying an additional fare. The Long Island, on the other hand, has provided at a tremendous capital outlay for the operation of its trains into congested sections of Manhattan and Brooklyn. Moreover, it is far from being proved that the suburban service of any of the steam lines not entering Manhattan is remunerative. To be sure there are two other roads besides the Long Island which are electrified and which enter the heart of the city, but these lines have an extensive through-line, standard rate traffic which the Long Island does not have. This case may well be followed closely by the railroads as a guide in determining future policies. The question is this: Is a railroad to be permitted to earn a fair return on its investment for providing suburban service, or not? If the answer is yes, then the railroads may make the expenditures which are required to give the public the service it demands. If the answer is no, then any railroad which sinks good money

into improving its suburban service would be acting un-wisely indeed. The people of Long Island are even now making extensive demands on the railroad for additional multiple tracking, grade crossing elimination, extension of electrification, additional tunnels under the East river. By their opposition to the effort to make previous investments of this character remunerative, they place themselves in that category of persons who would eat their cake and have it too.

Forecasting and the Budget

ALLIED with the subject of forecasting is the budget. In fact, it is for possible purposes of the budget that modern industry is giving consideration to the idea of forecasting business trends. The *Railway Age* has already pointed out that there are two entirely different and distinct kinds of forecasting—one embodying the study of trends of business for the long time period, say of five, ten or twenty years in the future, the other embodying study of trends of business fluctuations three to six months in the future. It is with particular reference to the forecasting of short term fluctuations—the temporary ups and downs of the business cycle, as distinguished from the normal growth of business over a period of years—that these paragraphs will deal.

The *Railway Age* will be remembered as having taken the position that the railways should study the possibilities of forecasting their future volume of traffic. It is not yet ready to admit that forecasting of railway traffic volume is entirely feasible. It arrives at its opinion that the subject deserves railroad study because of what it knows about the success that forecasting of business trends is having in other lines of industry. It is inclined to the belief that if forecasting is possible in as many industries as are deriving benefit from its application, there must be reason to believe that similar methods might prove successful in such a basic industry as transportation.

The relationship of budgeting and forecasting has been discussed previously in these columns, although possibly somewhat indirectly. It is brought to mind again by perusal of an article which appeared in the July issue of *Industrial Management* entitled "Applying the Budget System to Railroads." This article was written by Henry Bruere and Arthur Lazarus. Mr. Bruere is third vice president of the Metropolitan Life Insurance Company and will be remembered as the author of the first prize paper in the *Railway Age's* recent contest on co-operation between railway employees and management. The article covers twelve pages. It has been issued in reprint form. It will be published later, we understand, in amplified form as a study of the Policyholders Service Bureau of the Metropolitan Life Insurance Company. The article in question describes all too briefly some of the budget systems now in use on various railroads—unfortunately the names of the railroads are not given—for capital expenditures, for maintenance of way and equipment, for the control of material, for forecasting cash requirements, etc. The better part of the article discusses forecasting and attempts to analyze the opinions of different people as to the possibility or feasibility of forecasting. Unfortunately, the article fails to explain adequately the purposes of a budget and similarly it fails to show the purposes of forecasting in the budget plan. However, the article must be conceded to be a step in the right direction and a good beginning of what we expect to become an interesting and fruitful discussion. With that in mind we compliment the authors and *Industrial Management* for their skill and enterprise.

What are the purposes of a budget? Budgets classify themselves in four main groups, two of which relate to capital expenditures and two to operating expenses. The general classification, therefore, would be as follows:

A—Referring to additions and betterments:

1. To assist in determining the long-time trend of the additions and betterments program.
2. To assist in determining the capital expenditures for the ensuing year.

B—Referring to operating expenses:

3. To serve as a check on operating expenses.
4. To assist in laying out a future program for work in the maintenance of way or equipment departments, etc., so as properly to meet expected future peaks or dips in the volume of traffic.

The purposes of all four kinds of budgets are in their essentials the same. They are to assist the railroad to spend its money wisely to the end that it may not spend beyond its means on the one hand, and to the end, on the other, that it will always find itself able, as far as its means permit, to meet demands upon it for transportation service. Further than that and an expected corollary to it, is stability such as will result from the anticipation of what, without study of the situation, would be the unexpected.

One of the greatest needs of modern business is stability, by which is meant an evening out of the peaks and valleys of industrial inflation and depression.

Probably the greatest fault with the way the railways spend their money today is the manner in which it accentuates instability. The railways, as a general rule, spend money only when business is good, when prices are high and deliveries slow and then spend none when business is poor and prices are low. The car and locomotive market is a case particularly in point and the fluctuations in the equipment industry are so sharp as to have attracted the unfavorable comment of observers on all sides. References to the feast and famine character of the equipment market are too common to have escaped the attention of any important railroad officer.

There is also marked instability in connection with operating expenses. The railways spend money for maintenance of way and of equipment when they have money. They usually carry on much more maintenance work in good years than in bad, much more, it is admitted, than is required by the additional traffic of the good years. What is the result? Preparation for a traffic peak is often delayed until the peak is reached. Shops working on short time a few weeks before are suddenly put on overtime and, worst of all, equipment urgently needed to create revenue ton-miles must be held from service while it is being made ready for service or sent back into service still lacking much needed repairs. The opposite situation is equally well recognized—namely, an excess preparation for peaks that never materialize or delay in adjusting the repair program to a change in the traffic condition when traffic declines.

There are those who will say that the budget is often the very factor that intensifies the condition which is here criticized. They are correct. There are budgets that do that very thing; in fact, most of them do. An estimate is made of gross income, let us say. The pattern of expenses is cut to fit that estimate. The desired result is possibly a certain standard of net income or, in the case of capital expenditure, it embodies a willingness to spend more when net income is good, the opposite when it is not. The usual tendency just as with no budget at all, is to do the work when business is good and to cut when business is bad. We do accomplish one purpose of the budget idea, namely to keep within our means but, on the other hand, we arrive at the very instability that the budget should attempt to minimize or correct.

The trouble with budgets of this kind is that the factor of anticipation of future fluctuations of traffic—up or down—is secondary or entirely neglected. This, then, is where forecasting comes in. If it is feasible, it is that element which should supply the important factor at present missing in the majority of budget plans. Speaking from the standpoint of operating expenses, the ideal budget is one that is planned not to supply a certain net income but one that properly meets future needs and plans the work to be done at other times than when prices are highest, men hardest to get or the demands for transportation service at their height.

This brings us back to our question of the feasibility of forecasting business trends. The problem merits careful study. There is no other factor of *like nature* that offers the same promise as a means of eliminating present railway instability in the making of purchases or of carrying on the repair program.

The qualification "of like nature" is a necessary one. In great measure there has been, in the recent past at least, no way of avoiding a certain amount of instability in purchasing. The railways cannot spend money if they have none and cannot raise it. If net income is limited by low rates, unduly high wages or too severe regulation there will be but small purchasing power. But let not the railways dismiss the problem with an expression of this thought. Prior to 1913, when railways were prosperous, instability of railway purchases was at its worst. The railways are again fairly prosperous now. The demands of modern scientific railroad management will require study of this modern problem of budgeting and forecasting. If for no other reason than because transportation is a basic industry, the railways should lead, not lag behind, other industry in the development of these new scientific elements in modern business management.

Some Facts About Railway Wages

MOST OF THE RAILWAY LABOR LEADERS are participating in the LaFollette political movement to promote public ownership of railways. They hold out to railway employees the hope that they would get better pay under public ownership, and at the same time are trying to get the farmers to vote for it on the assumption that they would get lower freight rates. The officers of the Brotherhood of Locomotive Engineers and of the Brotherhood of Locomotive Enginemen and Firemen are foremost among the labor leaders who are supporting the LaFollette movement.

Meantime, the leaders of the Brotherhood of Locomotive Engineers and the Brotherhood of Firemen and Enginemen are engaged in a controversy with the western railways over wages and working conditions. They are also carrying on a dispute with the Railroad Labor Board over a question of jurisdiction. They asked the western lines for an advance in wages. The Conference Committee of Managers representing the western lines asked for an agreement to negotiate changes in certain working rule that it was claimed were causing the railways needless expense. The labor leaders refused to agree to negotiate regarding these rules. Fearing a strike order, the Conference Committee of Managers asked the Railroad Labor Board to take jurisdiction of the controversy. It did so and ordered the officers of the labor unions to appear and testify. They refused and it is now probable the Board will seek an order from a federal court to compel them to testify.

In view of these facts it is interesting at the present time to consider the earnings being made by engineers and firemen and also certain union rules that affect their wages. The average wage of all passenger engineers on Class I roads in 1923, according to the statistics of the Interstate Commerce Commission, was \$254 a month, or \$3,048 a year; of freight engineers, \$257 a month, or \$3,084 a year; of passenger firemen, \$188 a month, or \$2,256 a year; and of freight firemen, \$179 a month, or \$2,148 a year. There have been advances in these wages on some of the railways this year. The farmer who has been hard up and who the labor leaders are trying to get to vote for government ownership, seems likely to think, if given these facts, that engineers and firemen are pretty well paid. Furthermore, it would seem reasonable that engineers and firemen themselves should think

they are pretty well paid and should have doubts as to whether they would be better off under public ownership. They would find it difficult to discover any classes of postal or other government employees doing comparable work that are as well paid.

There are, however, some other important facts to be considered. The wages given are averages. This necessarily means that many engineers and firemen get more than the amounts stated. Furthermore, by abolishing certain rules the unions themselves are responsible for, they could make their earnings still higher. There is in effect on practically all the western lines what is called the "Chicago Joint Agreement." Wages of engineers and firemen are based principally upon the mileage run by them. The "Chicago Joint Agreement" requires regularly assigned men in passenger service to lay-off when they have run the equivalent of 4,800 miles a month and men in freight service to lay-off when they have run the equivalent of 3,800 miles. Some of the western roads have made records of the number of days in the year 1923 that individual engineers and firemen assigned to regular runs were forced to lay-off because they had reached the maximum mileage barrier. These records show that in many cases the engineers and firemen, on account of this restrictive rule, lost from 30 to upwards of 100 days' work, and that in spite of this a substantial percentage of engineers earned from \$3,000 to \$4,000 and of firemen from \$2,000 to \$3,000. If these men had worked full time the earnings of some of the firemen would have been as much as \$3,500, and of some engineers as much as \$5,000. For example: Take the cases of ten firemen who made average earnings of \$2,285 in spite of the fact that because of the "Chicago Joint Agreement," they laid off an average of 132 days. For the 233 days' average time actually worked they made average earnings of \$9.81 a day. If they had worked 365 service days their average earnings would have been \$3,581. If they had taken only one day off each week they would have earned an average of \$3,070, or \$785 more than they did.

Again, take the case of ten engineers who made average earnings of \$3,643 and laid off an average of 110 days. Their daily earnings averaged \$14.29. If they had worked 365 days their year's earnings would have averaged \$5,216. If they had laid off an average of only one day a week their earnings would have averaged \$4,473, or \$830 more than they did.

Why do these unions thus restrict the working time and the earnings of their members? First, to prevent the railway managements from being able in reply to demands for advances in wages, to show that the rates of pay are so high as to make possible such earnings. Secondly, to keep more men on the payroll and thereby have more men available to pay dues to the labor unions.

Indirectly, this rule, like many others in effect, operates to inflate railway expenses, and thereby inflate the freight and passenger rates the public must pay. The wages per day now paid by the railways are sufficient, if employees worked full time, to produce annual earnings, for many employees which would be an effective answer to demands for advances in wages. Because, however, the annual earnings of employees are restricted, the leaders of the labor unions are able to use them as an argument for higher rates of pay. When they are successful in thus using them the daily rates of pay are increased, and thus the railroad payroll and railway operating expenses, and also the freight and passenger rates the public must pay, are increased.

Just why locomotive engineers and firemen, in view of their high rates of pay under private ownership, should be in favor of public ownership is extremely difficult to understand. The labor leaders anticipate that if public ownership should be adopted their influence in the management of the railways would be greatly augmented. Just why, in view of the present policies of the labor leaders regarding rail-

way working conditions and wages, the farmers or any other people should believe that an augmentation of the influence of the labor leaders in railway affairs would tend to reduce the cost of transportation and the rates that must be paid for it, is impossible to understand.

Shop Production and Railroad Business

THIRTY PER CENT of the total operating expense of the railroads in 1923 were charged to maintenance of equipment. Economies effected in the mechanical department, in comparison with other departments, should be an important item in the total operating expense of a railroad. In many respects the problems of this department are similar to those of a manufacturing concern. Both the manufacturer and the railroad shop superintendent have to consider labor turnover; regulation of output to suit business demands, as well as the improvement of their product. Whereas, a reduction in the cost of operating a manufacturing plant means a considerable reduction in the cost of the manufactured article, a similar reduction in the mechanical department's expense has only a slight effect on the cost of transportation. In other words, the scope of a railroad's activities, in comparison with other industries, is so varied that any economies effected in a department that absorbs only 30 per cent of its total operating expense must be considerable in order to have any appreciable effect on the ultimate product.

Another phase of this question to be considered is that many department supervisory officers forget what a railroad is in business for and as a result they tend to overemphasize the work of their own department. Some instances can be cited where shop schedules and repair programs are planned without giving proper study to future requirements. This is a difficult job for the average mechanical department head. As a rule he is not familiar enough with general business conditions to estimate intelligently what the probable future requirements will be. If a railroad has a sudden demand for extra transportation service, for which the shops are not prepared, they must work overtime. If a slump in business occurs the shops are required to curtail production and lay men off. This system of maintaining equipment is not economical and must be paid for sooner or later. A budget based on the study of the year's requirements should keep the expense of maintenance down. But a budget can be made a nightmare to the officer who is required to let his equipment run down and reduce the working force in order to keep his department's expenses within the allotted figures. This system also tends to increase maintenance costs as well as labor turnover.

There is still another point to be considered in this connection and that is maximum production is not always economical production. After production passes a certain point the profits per unit tend to decrease, that is each plant is limited as to the amount it can produce with the greatest economy. This factor is applicable to railroad shops that perform classified repairs and production work for an entire system.

Shop output should be regulated by transportation demands. Periodic meetings of the various department heads with the executive officers would be a big help in the solution of the problem, especially if these meetings are held before work on the plans for the year's repair program has been started. The work of the mechanical department is closely allied with that of the transportation department which makes it essential that an efficient liaison between the two be maintained. The mechanical department is in many respects a manufacturing establishment in itself and is subject to the many ramifications of a manufacturing industry. The fact

that what determines the product of the mechanical department is more remote than that found in a manufacturing industry is reason for close collaboration between the two. The transportation department supplies the customer of the railroad but without the efficient backing of the mechanical department it can do nothing.

In order to sell transportation the railroad must supply adequate and sufficient equipment. This cannot be done unless the mechanical department has a full and adequate knowledge as to what is demanded by the railroad's customers and can plan its work accordingly.

Books and Special Articles of Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Construction Equipment. A report on current practices. Economical life in years, annual expense, per cent of capital investment, average use, months per year, expense per working month, for railroad equipment used in construction, included in table on p. 3-4, 16 p. Published by Associated General Contractors of America, Inc., Washington, D. C. 50 cents.

Matters of Transportation, by J. H. Parmelec. In Proceedings of American Association of Ice and Refrigeration, 1924, p. 93-97. Pub. by the Asso., Chicago, Ill.

Super Power Studies. North East Section of the United States, by North-East Super Power Committee. 12 p., 17 plates. Published by the Committee, care U. S. Dept. of Commerce, Washington, D. C.

Text of the Thirty-Sixth Annual Report on the Statistics of Railways in the United States for the Year Ended December 31, 1922. Prepared by Bureau of Statistics, U. S. Interstate Commerce Commission. Contains statistics based on monthly and quarterly reports of railways for year 1923, also CXI p. Published by Govt. Print. Office, Washington, D. C. 20 cents.

Wages, Hours and Employment of Railroad Workers. Research report No. 70 of the National Industrial Conference Board, abstracts of which appeared in the *Railway Age* for August 16. 80 p. Published by National Industrial Conference Board, New York. \$2.00.

Periodical Articles

The Deterioration and Preservative Treatment of Timber, by A. S. Dawson. Requirements of Canadian railroads, p. 559; economic value of treated timber to railroads, p. 561-562. Engineering Journal [Canada], August, 1924, p. 558-563.

Metallurgical Re-Heating Furnaces for Blooms, Billets and Slabs, by A. P. Theuerkauf. ". . . The superior results accomplished in the rail mill . . . have given us a better name with the railroads and inspection bureaus . . ." p. 558. Engineering Journal [Canada], August, 1924, p. 547-558.

The Riddle of the Rails, by Barnard Powers. "Why railroad securities advanced while earnings declined." Magazine of Wall Street, August 16, 1924, p. 596-597.

The United States Steel Corporation and Industrial Stabilization, by Abraham Berglund. "Output of rails for the years 1880-1901 and 1902-1922, shows less difference in average deviation than steel products generally; but during period 1902-1915, when prices were rigidly fixed, fluctuations were very great," p. 618-622. Quarterly Journal of Economics, August, 1924, p. 607-630.

Who Steals the Railroads? The Attempted New England Consolidation. Barron's, August 11, 1924, p. 7.

Letters to the Editor

[The RAILWAY AGE welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about 250 words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.]

Train Dispatching and Irrigation

QUONOCHTAUG BEACH, Rhode Island.

TO THE EDITOR:

Having had something to do with the train dispatching on the New Haven in times past, I find it particularly interesting to follow the controversies as to the relative merits of the "positive meet" and right by direction methods of train dispatching.

Harry W. Forman, in his letter published in the *Railway Age* of August 2, permits his verbosity to becloud slightly the luminosity of his argument—and this is somewhat disappointing because I have always been an admirer of his lucid style and clear statement of facts. Getting down to "Rhode Island English," however, I take it that he questions the clear understanding as to which train takes the siding under the "positive meet"; bears down on the fact that the roads using the positive meet are in the minority; admits that it may be a bully good thing in crowded territory but would not do after you cross the Missouri River; and declares that where some or most of the freight is handled in extra trains there would be disadvantages and that it would be inconvenient where open offices are as much as 50 miles apart.

The matter of taking siding is very clearly covered by a general rule, which specifies that the trains in a certain direction will always do so at regular or arranged meeting points and this applies to extras as well as regular trains. The New Haven is perhaps the only road that generally uses this method today, but the grandfather argument is inherently weak; every progressive movement was started in a small way. It is a historical fact that those who inaugurate such movements are usually dubbed cranks, fanatics and so on, until such time as their methods are generally adopted. This is merely a repetition of what was gone through with standard couplers and the air brake and, in a manner, is now being fought out on the general substitution of the Form 19 order for the Form 31.

There can be little question as to the merit of the two systems and we might remind Mr. Forman and others that there are two sides to every question. Those arguing in favor of the positive meet have very generally had experience on both sides, while those opposing have probably never worked under it. The late Robert G. Ingersoll, in giving advice to a father, said: "Don't tell your son honesty is the best policy—and let it go at that; tell him you have tried both and know whereof you speak." It then becomes convincing. An ordinary analysis, however, by any student, should clearly demonstrate that under one system the engineman—and after all it is very largely up to him—has to do only with and keep in mind *location*. Under the others, he has to do with *location* and *time* and, as has been very well stated by "Professor," the time order is the Devil's own handiwork. After all, right by direction is nothing in the world but a permanent time order. And the merits of the two systems may perhaps be placed in parallel with the space interval and time interval in keeping trains apart.

One argument brought up appears to some of us who have been in with and watched the evolution from right by direction to the positive meet, as bordering closely on the absurd;

that is that it may be a good thing east of the Missouri river but not west, where we "find a very different state of affairs." An officer of the New Haven recently showed me a letter from an operating officer of considerable experience on a neighboring road, which said in part:

"The New Haven has a multiplicity of short branch lines with many junction points, and perhaps a larger number of short run connecting trains than any other road in the country. Under these conditions, it is not difficult to see why they prefer the positive meet. The conditions of the western and southern lines are diametrically different."

Why not say that if it is a good thing under these difficult conditions, it would be a corking good proposition anywhere? In other words, turn themselves around and reverse their argument. I am reminded of a man who built and operated railroads in the Northwest and afterwards bought a farm here in Rhode Island, on which he retired; and one of the first things he did was to construct an irrigation plant. When he showed me and explained his undertaking, I nonchalantly reminded him that it rained very regularly in Rhode Island and he did not need the irrigation plant to which he was accustomed in the Western arid regions. He promptly agreed with all I said but added that while the irrigation method is absolutely necessary in certain regions of the country—because you can't raise anything without it—it is an advantage to the farmer in sections where it may not be necessary, for the obvious reason that it enables him to supply his growing crops with the necessary moisture regularly.

The argument about the open offices being 50 miles apart would seem to vaporize when, in looking over the timetables of the New Haven, we find that trains are operated over lines with all of that distance between open offices; and it might also be well to remind some of our dyed-in-the-wool right by direction friends that there are no freight trains scheduled on the New Haven road—all are run as extras.

D. A. J.

Questions for the Superintendents' Association

SAN FRANCISCO, Cal.

TO THE EDITOR:

The Train Rules Committee of the American Association of Railroad Superintendents in its report printed in your issue of June 28, page 1818, shows a fine spirit of progress but certain points invite comment. Why must we always have either a feast or a famine?

We have had a famine in train order handling for many years, for the reason that a certain prejudice has existed against the use of Form 19. The Standard Code has for years authorized the unrestricted use of Form 19 but the fact seems to have been overlooked by the Association of Railroad Superintendents. This oversight, no doubt, was caused by restrictions that have been placed on Standard Code Rule 211 by various roads. The following note, first published 30 or 40 years ago, appears on page 281 of the 1920 edition of the Standard Code:

"The Committee has recommended two forms of train orders—the '31' order and the '19' order—leaving it discretionary with the roads to adopt one or both of these forms."

The advantages in the unrestricted use of the 19 Form are desirable, but we cannot have our pie and eat it too.

Form 19, under Standard Code Rule 211, is just as safe as Form 31 ever was, with a few exceptions. These exceptions must not be overlooked in our desire to reduce the consumption of fuel and increase the average speed per hour. If the operator hands the order up to an over-zealous engineman whose inclination is to crowd the train order signal at the highest possible speed, instead of waiting until the train has been brought to a stop, it is liable not to look "just as safe" as if it were an order that required a signature.

The option retained by the superintendents' association is

an admission of weakness in the system recommended. Otherwise, why permit its use for restricting purposes only within block signal limits?

Neither the present Standard Code Form "A" clearance card nor the proposed new form requires the train dispatcher to check the order numbers with the operator. The operator who overlooks an order will overlook placing its number on the clearance card. Would the checking of the clearance card by the conductor and engineman detect the oversight on the part of the operator?

The second paragraph of Rule 94, standard code, does not as stated, give a train the right to *change orders* and proceed. However, neither paragraph of Rule 94 has any bearing on the form used.

The requirement of signatures in Rule 217 has to do not so much with the delivery of the restricting order to the train in whose care it is sent as with the delivery to the train that is restricted (at a point not a train order office).

The requirement of signatures of the conductor and engineman to a restricting order after a train has once been cleared, as stipulated in Rule 219, is very necessary as there are too many chances for a real or a pretended misunderstanding between the conductor, the engineman and the operator. It is not likely that the ultra-conservative A. R. A. committee on transportation will desire to disturb the peaceful sleep of such rule experts as Robert Pitcairn, A. W. Sullivan, F. C. Rice and the others who had a hand in making this rule.

Why not use Form 19 to restrict a train both without and within block signal limits, with reasonable restrictions? Since January 1, 1923, we have on the Southern Pacific used the 19 Form to restrict trains, making no exception of non-block territory. Our 31 orders will not exceed three per cent of the total orders issued.

The presence of a block signal system should not enter into the question.

W.M. NICHOLS.

Protecting the Rear of Passenger Trains

SAN FRANCISCO, Cal.

TO THE EDITOR:

There are some interesting points in Mr. White's article concerning division of responsibility in his treatise published in the *Railway Age* of July 26, but whether or not his recommendations would bring about fewer collisions, is a point on which I do not get much light. One of his main points is that of the risk that is run while waiting for the flagman to return to his train. A western road has a rule, reading:

"Except within automatic block signal limits, when the view is obscure, trains must approach stations at a rate of speed that will enable them to stop should an emergency arise. Responsibility for collision rests with the following train, but this does not relieve the leading train from protecting itself."

I questioned one division superintendent of long experience as to how, under such a rule, he would fix responsibility, in doubtful cases, should a collision occur, since the rule seemed to divide the responsibility. Being a vigorous man of few words, he replied, "Fire both the engineer and the flagman."

Where is the division of responsibility in the present practice? Enginemen are required to respect block signals, and at the same time flagmen are required to protect their trains fully, when possible; and within block signal limits, the same as elsewhere. Nor should it be expected that the minds of men can be made over by the mere act of changing the wording of a rule. The generic fault lies in ever permitting anyone to assume that a certain employee will so

carry out his part of the rules as to make it unnecessary for others to perform their full duty, independently.

In several of the cases mentioned by Mr. White the engineer should have forgotten the flagman's duties or instructions, and the flagman should likewise have given no thought to the protection that the block signal would afford. He should have used all of his signals, visual and audible; one without the other is not sufficient. Each man must always take the initiative, do his part, assuming at all times that the other man may do nothing.

I cannot see how anyone can contend in sincerity that a withdrawal of flagmen would insure greater safety. There is no guarantee that enginemen will ever be more careful than they are at present.

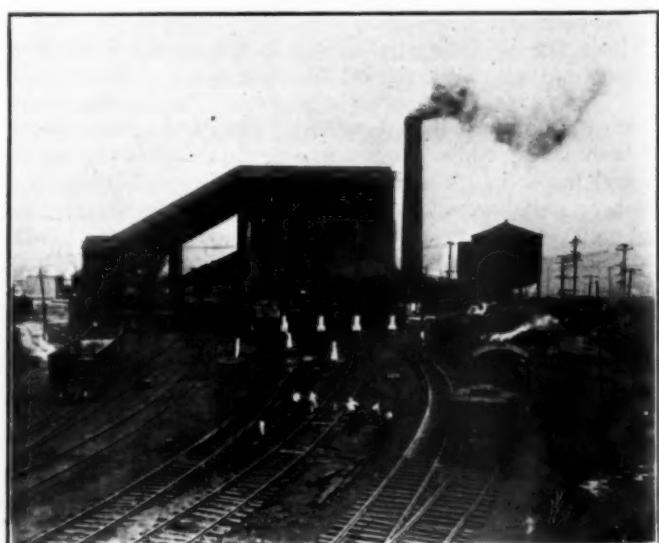
I have often wondered how flagmen regard crossovers or diverging tracks within yard limits. Should there be such turnouts only a few hundred feet back of a train where the view of the rear of the train is obscured; should the flagman safeguard such points, or should he go on back, say from 1,000 ft. to one-half mile? Generally, a chance is taken; such places are not guarded; while yet there is nothing to prevent a work extra or a yard engine from crossing over to the other track and striking the delayed train.

Should a yard engine come in between the flagman and his train, must the flagman then go around that engine and remain between it and his train? Or should he keep the proper distance back to stop any train that may approach on the same main track that his train is using?

Has anyone noticed the markers on the rear of some observation cars? The awning so obstructs the view that often they cannot be seen at all, particularly when passengers may be standing near them. It is practically impossible for the engineman of a following train to see them. Now let a couple be spooning within the car, with shades drawn, and we have a passenger train standing on the main track without anything in the way of a light displayed to protect it or give notice of its proximity. The lighted "banners," or trade marks which are used at the rear of many first-class trains are not such an unnecessary thing as may have been supposed. They accomplish two purposes—advertise the character of that particular train, and add materially to its protection.

HARRY W. FORMAN.

CANADIANS who have been living in the United States and who have returned to Canada this year, have numbered, in the three months of April, May and June, a total of 13,743.



Ewing Galloway

New York Central Engine Terminal, Rensselaer, N. Y.

Rebuilding 178 Miles of Line in Four Months

Western Pacific Overhauls Its Property in Nevada for Joint Operation with Southern Pacific

By William S. Wollner

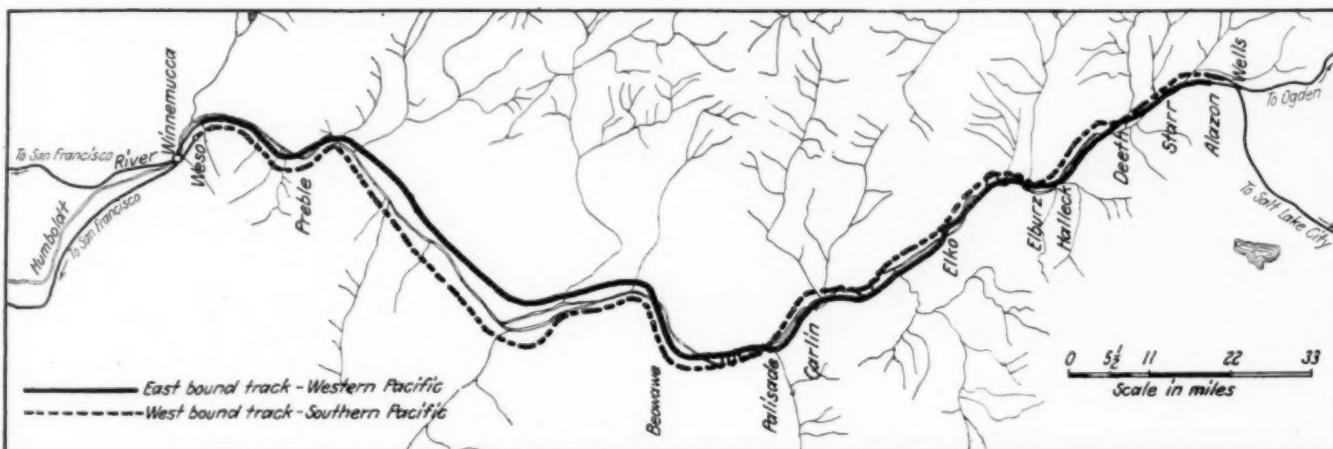
ANNOUNCEMENT was made in the *Railway Age* of March 22, 1924, of an agreement between the Southern Pacific and the Western Pacific to operate their single track lines between Alazon and Weso, Nev., as a double track line for 50 years. The Western Pacific line between the points named is 178 miles long, making this the longest paired track operation in the country. The Western Pacific line will be used as the eastward track and the Southern Pacific as the westward. Each track will be operated by the superintendent and division staff of the owning road as under the single track arrangement.

As shown on the attached sketch, the roads closely parallel each other, the Western Pacific crossing over the Southern Pacific's tracks at about the middle of the paired track

Work to Be Done

It is generally believed that the agreement between the companies required the Western Pacific to bring its track to Southern Pacific standards, but this is not so. The Western Pacific adopted standards of its own to which the structures, roadbed and track were made to conform. The work to be done consisted in widening cuts that were 16 and 18 ft. wide to a width of 20 ft. and the widening of fills which were nearly all 16 ft. wide to a finished width of 18 ft. after the estimated shrinkage of the newly placed material had occurred.

Two hundred rails had to be renewed and 400 joints built up by the electric process. Ties were replaced where necessary and tie plates placed on all ties, this necessitating the



The Location of the Two Lines

territory. The pairing of single track roads for a distance of almost 200 miles is unique, but no less remarkable is the fact that the Western Pacific's track was placed in condition for the greatly increased traffic in a period of four months. In spite of a fairly heavy traffic for a road of its kind, 200,000 cu. yd. of material was placed in widening banks, 300,000 cu. yd. of ballast was applied, as were 1,170,000 tie plates, with practically no delay to revenue traffic. The methods used in this accomplishment are of interest to railway men.

The Western Pacific's line between Salt Lake and San Francisco is unusually well located. There are no heavy grades and few sharp curves except where they were necessarily used in passing through the Feather River canyon. In the paired track territory the maximum grade in both directions is 0.4 per cent and there is practically no adverse grade against westbound traffic. The maximum curvature is 5 deg. and there are only a few curves as sharp as this, these being in Palisade canyon. Most of the curves are 1 to 1½ deg., all tapered with Searle's spiral.

The territory in which this work was done has the widest range of temperature in the United States. At one point, Halleck, the temperature frequently falls to 56 deg. F. below zero in the winter months and rises to 100 deg. above zero in the summer months. A minimum temperature of 60 deg. below zero has been registered at this point.

drawing of every spike in the 178 miles. The placing of nut locks likewise necessitated the removal and replacement of the nuts on the bolts of every joint.

Connections between the Southern Pacific and Western Pacific tracks were made at eight different points, double connections being made at two of these points and a triple connection at one point. Passing tracks were extended and extensive yard changes were made at Elko. In addition, rail anchors were applied, automatic block signals were installed and numerous other tasks performed to place the entire plant in first class condition for heavy main line operation.

Widening Cuts and Fills

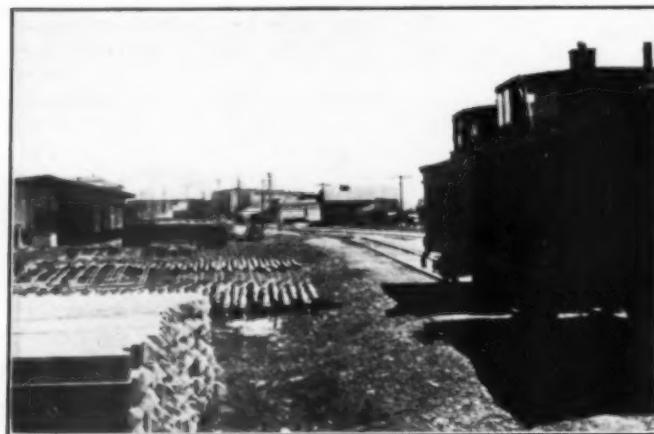
Cuts were widened by means of a Jordan combination ditcher and spreader and an American ditcher. The Jordan spreader was used in shallow cuts, the American ditcher in larger ones. Fills were widened partly by means of teams but mostly with material hauled by train. Four steam shovels were used for loading bank widening material in seven pits. The average maximum haul was 20 miles in trains of 30 cars each, a total of 165 cars being used in this service. The daily average output of each steam shovel on bank widening work was 1,700 cu. yd., individual shovels frequently loading 2,800 cu. yd. per day, the highest record being 3,080 cu. yd. The material was handled in Rodger ballast side dump cars and unloaded by a Lidgerwood with

side and center plows. After placing, the fills were shaped with a Jordan spreader.

Two ballast pits were opened, one at Winnemucca and the other at Luke and an excellent quality of desert gravel was produced. It is notable that these pits were 230 miles apart, requiring a maximum haul of 134 miles and an average haul of 60 miles. Two steam shovels were used for ballast loading, one in each pit. The average output per pit per day was 2,500 cu. yd. with a maximum of 3,250 cu. yd. Three hundred and fifty Hart convertible cars, arranged in center dump position, were used for hauling the ballast, 10 trains of 35 cars each being assigned to this service.

Rail and Fittings

In 1908 and 1909 this section of the Western Pacific was laid with 85-lb. rail rolled by the Colorado Fuel & Iron Company. That the chemical composition and section of this rail was well adapted to the territory and traffic for which it was designed, is demonstrated by the fact that it was found necessary to replace only 200 rails in the 178-mile



Well Arranged Signal Material Yard at Elko

stretch. Considering the climatic conditions, the traffic to which the rail was subjected, and the fact that it is in desert territory, this is a remarkable performance. The 400 angle bar joints that were removed were replaced with joints of the 100 per cent type and battered rail ends were built up by the electric welding process.

The former standard provided for eighteen ties to the 33-ft. rail length with tie plates only on curves of three degrees, but this has been changed to 20 ties to the panel, all provided with inclined tie plates. The plates on curves were also replaced so that every tie has two new plates on it. A heavy tie renewal was required and was taken care of with sawed Douglas fir 7-in. by 9-in. ties. The replacing of tie plates required the drawing of every spike and these spikes were replaced with new $\frac{5}{8}$ -in. by 6-in. spikes of the full throated type. Hi-power nut locks were provided for all bolts. Fair rail anchors, eight to the panel, were installed over the entire distance. These were placed, four against eastward and four against westward traffic, but when the track is turned over entirely to eastward traffic, the four anti-creepers now turned against westward traffic, will be reversed so that all eight anchors will be against the current of traffic.

Bridges and Signals

The Western Pacific's program in connection with the paired track project provides for bridge replacements amounting to \$1,100,000. This consists of the replacing of 26 wooden structures with steel or concrete spans. Most of the structures will be replaced with single-span riveted

through trusses on concrete abutments. Four bridges will be constructed during the present year while the remainder will be rebuilt during the succeeding few years. The only portion of the track that was signaled at the time the contract was signed was through the Tonka and Palisade canyons, but the entire 178 miles is now being signaled with the Union Switch & Signal Company's latest type of lower-quadrant, two-position signals.

The only change made in alignment or grade was one minor grade change at a bridge site and some slight changes in curves to convert compound to simple curves. Roadway signs are being replaced with new ones complying with the Western Pacific's recently adopted standards. Water stations were increased in capacity and some station buildings reconstructed and relocated. Ten new units of section quarters consisting of a section house and bunk house were constructed. Connections with the Southern Pacific tracks were made at the following points: Two at Weso, one at Preble, one at Beowawe, one at Palisade, two at Carlin, three at Elko, one at Deeth and two at Alazon. Those cross-overs that are to be used at high speed have No. 14 frogs while the balance are No. 10 turn-outs. The No. 14 frogs are solid manganese of the Conley self-guarded type.

Passing tracks were extended at Starr and Elburz and a new main line was constructed at Elko with extensions to yard tracks and the installation of new repair tracks to replace the old ones which are to be used for other purposes.

How the Work Was Done

The widening of cuts and fills was first undertaken. As soon as this work was completed and track work well along, ballasting was started. As stated previously, cuts were widened with the use of a Jordan spreader and an American ditcher, while banks were widened partially by team haul but largely by train haul from seven pits. No additional track facilities were provided for handling the ditchers or spreaders or the work trains connected with them, although the ordinary revenue traffic over this part of the Western Pacific consists of two passenger trains, often run in sections, and one through freight train in each direction daily, a local freight in each direction every other day, and numerous extra trains.

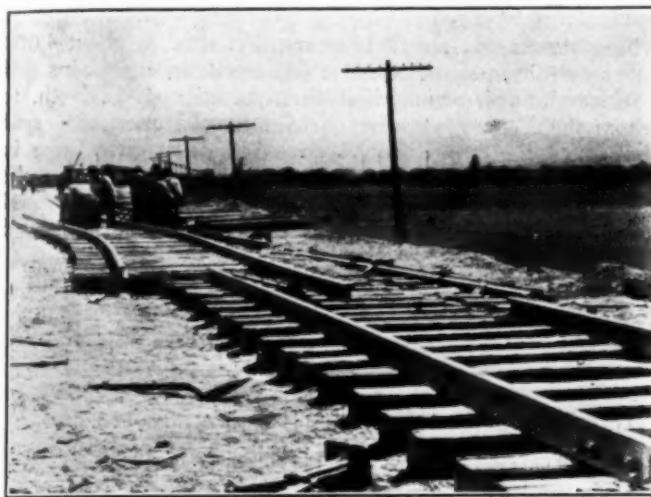
As soon as the cut and bank widening work was completed, track work was commenced. Driving rail was the first operation, after which gravel was spread and the track given its first raise. Ties were then added and tie plates applied. Rail was lined and old spikes, angle bars, etc., placed along the shoulders of fills to be loaded later. Old spikes were segregated according to quality; those warranting treatment will be annealed, straightened, put through a die and then used in side tracks and branch lines. Other spikes were scrapped. Ballast for the second raise was then unloaded and the second raise given. A finishing gang then spotted the track, made final line, adjusted the ballast, put on anchors, shaped the ballast section and dressed up the roadbed in cuts. The shaping of ballast and dressing up of the roadbed section on fills was done largely with the Jordan spreader with wing attachments, obviating the necessity of handling ballast with push cars.

Part of the Work Was Done by Contract

Part of the paired track work was done by Western Pacific forces and part by contract. The work done by the railroad company consisted of the widening of cuts and fills, other than that done with teams, and the use of its section and extra gangs on side tracks and special track work such as the extension of tracks, the installing of temporary wye tracks for turning power and the installing of temporary tracks at new bridge sites, and for the contractor's use at each of five tunnels.

Contract work consisted of the team borrow necessary for bank widening, all track work and the construction of new bridges. The work was let in one contract to the Utah Construction Company, of Ogden, Utah, which sub-let half of the team work and half of the track work to the Morrison-Knudsen Company, and the bridge work to the Wattis-Samuels Company. The Utah Construction Company did half of the track work itself and sublet half of the team work to small contractors.

The contractors installed nine camps, accommodating from 50 to 350 men each, and four camps on bridge work accommodating 20 men each. They employed a working force of



Shifting Main Line to Siding in Elko Yard Without Delay to Train or Yard Movements

approximately 1,400 men on track and bridge work, 1,700 men having been employed at one time. These men were recruited from distant points, including Salt Lake, Utah, and towns along the Western Pacific in California as far west as San Francisco. Track forces were divided as follows:

Driving rail	25 to 30 men
Tie plating	100 men
Lining track	20 men
First raise	100 men
Second raise	75 to 80 men
Finishing gang	60 to 75 men

Anti-creepers were applied by the tie platers and the finishing gang while a small gang that followed applied angle bars and tightened bolts.

All of the contractors' camps were tent camps and were supplied with spring cots, mattresses and blankets. Special effort was made to provide a superior quality of meals to attract the best class of workers. Laborers were paid 40 cents an hour, and spikers 45 cents an hour, while foremen were paid from \$150 to \$200 a month and board. What may appear as an unusually high rate of pay for foremen is a result of the contractors' desire to secure and hold thoroughly experienced men of the highest type. The contractors' camp were organized to complete four miles of track per day.

Engineering Organization

The Western Pacific's organization for handling the work done with its own forces consisted of an engineer in charge, assisted by three roadmasters and two assistant trainmasters. The assistant trainmasters supervised the operation of work trains and assisted the roadmasters in looking after steam shovel pit operations. In addition to supervising steam shovel pit operations, the roadmasters also made personal inspection of the track work performed by the contractors, a railroad inspector under the roadmasters' supervision being

assigned to each contractor's track gang. These inspectors were instructed by, and responsible to, the roadmasters insofar as looking after the track work performed was concerned while their reports of work performed or material required were submitted direct to the office of the engineer in charge.

The staff at the headquarters office consisted of an accounting engineer and two clerks who handled the accounting for the entire job. All departments of the railroad sent invoices and summaries of their charges to the engineer in charge where the distribution and posting was handled and where all material and labor charges were summarized and sent to the system auditor with a monthly report.

A material yard was maintained at Elko exclusively for the paired track work under the direction of a material yard clerk under whom a material foreman and yard gang were employed. The distribution of material as well as its receipt was under the direction of the engineer's office. Other forces reporting to the engineer in charge consisted of three bridge inspectors on work performed under contract, and three engineering parties consisting of an assistant engineer and five men housed in outfit cars consisting of cook and sleeping cars. These parties were so organized that it was possible for each party to run profiles, set ballast stakes and do transit work on curves without at any time slowing up the progress of contractor or company forces. The contractors' general organization consisted of a superintendent with a general office organization, a general foreman, and a camp foreman in charge of each outfit who was provided with a time-keeper and the usual sub-foremen.

The successful manner in which this work was handled under what might otherwise have been difficult circumstances was due to many causes, the outstanding ones of which are the following:

(1) The paired track project was placed under an organization with no other responsibility than this job. The division superintendent and his staff were permitted to continue their ordinary operating functions and, due to the fact



Laying a New Siding

that they did not have the responsibility for this work added to their numerous other duties, they were able to co-operate with the special organization in charge to the benefit of the road's usual operations and the progress of the twin-tracking work. The engineer in charge of the project reported direct to the chief engineer and was able to devote his entire attention and effort on the work in hand.

(2) The roadmasters who will be responsible for the maintenance of the track when the present project is completed were placed in the project organization on their own districts, giving them a dual interest in the work: First, to see that it was done in a first-class manner and second, to

see that the work involved in the project and the current maintenance did not conflict.

(3) The assigning of assistant trainmasters from the division conductors' roster relieved the trainmasters of responsibility for work train movements, although it is noteworthy that the trainmasters did lend a great deal of cooperative assistance in seeing that work train and revenue train operation did not conflict. It should be noted that there were as many as 14 work trains in operation at the same time.

The twin track project was in charge of J. W. Williams, chief engineer of the Western Pacific, while B. J. Simmons was engineer in charge. The accounting engineer was C. H. Byers.

Great Northern's Fruit Movement for 1923-24

THE MOVEMENT OF FRUIT by special train over the Great Northern Railway from Wenatchee, Wash., to St. Paul, Minn., in the season of 1923-24, totaled 375 trains, in which there was an aggregate of 15,337 carloads; and a record of the time of arrival of these trains at the eastern terminus shows an average of 8 hrs. 13 min. bet-

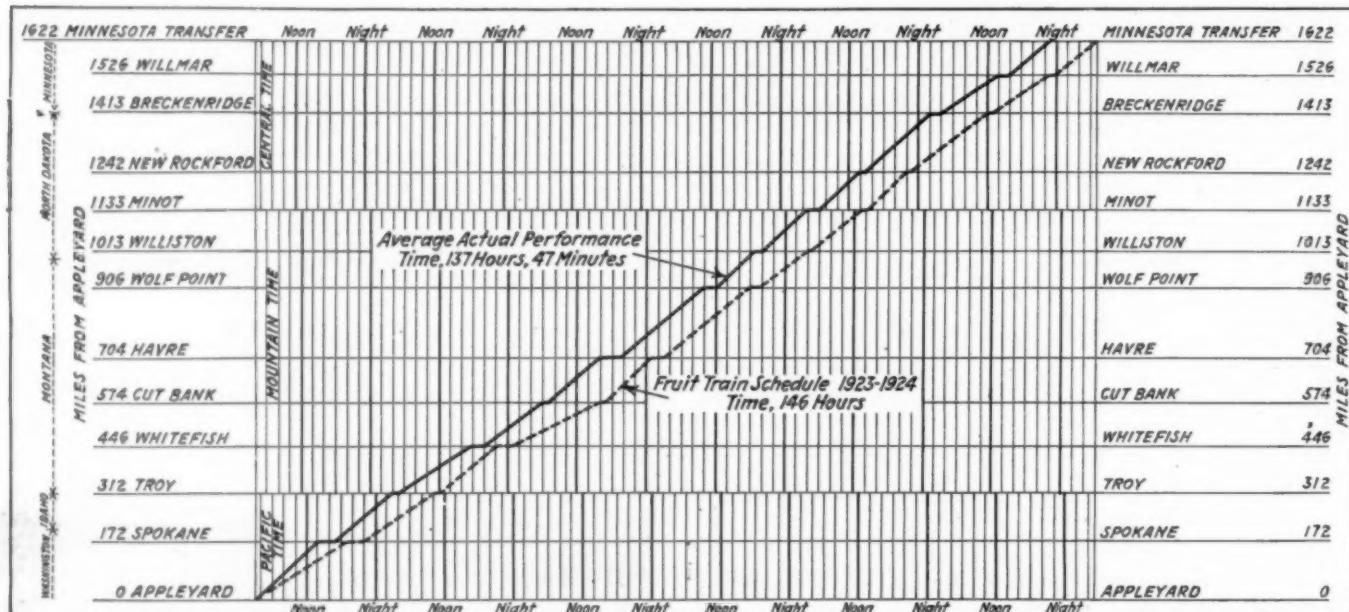
not over one car to a train. The total here shown does not cover the whole of the freight movement over the Great Northern as there are considerable shipments at the beginning of the season, and the end, when the movement is not sufficiently heavy to warrant the running of special fruit trains. The total movement from the Wenatchee district last season amounted to:

	Cars
Apples	18,164
Pears	628
Peaches	196
Cherries	131
Apricots	102
Prunes and plums.....	30
Mixed carloads.....	320

These items aggregate 19,571 cars, or a total of about 4,000 cars in addition to the fruit carried on the special trains.

General Superintendent of Transportation J. C. Roth, to whom the *Railway Age* is indebted for the chart, has said that about the only complaints from shippers were those in cases where the trains were too far ahead of the schedule. He says, "Naturally the shippers were very much pleased with this performance, although some of them complained cars moved so fast they could not divert them; and, in fact, we have had one claim presented on account of this."

For the coming season the Great Northern will improve the



Average Speed of Great Northern Fruit Trains, Wenatchee, Wash., to St. Paul, Minn., 1923-24.

ter than the schedule. The scheduled speed of these fruit trains is shown on the accompanying diagram, in a broken line; and the solid line above this shows the actual average time.

The schedule, 146 hrs. for the 1,622 miles, averages 11.11 miles an hour, while the actual performance averages 11.77 miles an hour.

It will be noted that the trains averaged about 40 cars per train. Of the total, 8,129 cars were iced; 2,301 were ventilated cars, and 613 cars had heaters; and of the remainder, 4,294, which were classified as under "Carriers' Protective Service against cold," a part were heater cars and a part were moved under ventilation. The icing stations are at Spokane, Whitefish, Havre, Wolf Point, New Rockford, Breckenridge and Willmar.

The contents of these 375 trains consisted almost entirely of apples, the average number of cars of other fruit being

icing facilities at a number of points and will establish emergency icing stations at certain intermediate points.

THE NORTHERN PACIFIC has announced a reduction in freight rates on canned salmon, clams, herring and shad, moving eastbound from the north Pacific coast, the reductions ranging from 10 to 15 cents per hundred pounds.

THE FIFTIETH ANNIVERSARY of the opening of the Chicago division of the Baltimore & Ohio was celebrated at Willard, Ohio, on August 13, 14 and 15. A parade, baseball games and a program of addresses on the closing day were features of the celebration. Among the speakers were Daniel Willard, president of the Baltimore & Ohio, Warren S. Stone, president of the Brotherhood of Locomotive Engineers, C. W. Galloway, vice-president of the Baltimore & Ohio and D. F. Stevens, general superintendent.

How a Personnel Department Aids Co-operation*

Stabilizing Employment—Selecting and Training—Ameliorating Conditions Causing Complaint

By Edward M. Harris

Safety Representative, Personnel Department, New York, New Haven & Hartford

IN UNDERTAKING to develop plans for promoting co-operation between railways and their employees for obtaining efficiency, the *Railway Age* is rendering a distinct service to the entire nation, a service to which its columns have long since been devoted with a keen appreciation of values.

It may not be difficult to suggest a theory that seems full of promise, but theories don't work in the midst of the complexities of social and economic conditions without being affected by them to a very considerable extent. Computations dealing with natural law require that allowance be made for various interferences and imperfections before an approximately accurate forecast of results is possible. How much more then is it necessary to allow for the varied and irregular performance of human nature when we attempt to shape a program for efficiency; not that human nature changes very much, but it is subject to a wide cultivation and control.

Authority Guarded with Jealousy

Any formula, therefore, that may be determined upon will require persistent effort to fulfill the conditions that are involved. Failure in one particular may be discovered and remedied only to find another more difficult to handle. Habits of thought and of conduct which have determined policies that are of years standing must be overcome or removed, and a general acceptance of the plan or formula that is adopted must be secured. This, too, presents its difficulties, because of the jealousy with which a little authority is usually guarded from disturbing influence.

Before going further we may note some things that have hindered co-operation and lowered efficiency. The knowledge of what not to do is as important sometimes as knowing what ought to be done.

With the organized direction of labor interests there came a new development of power, and the inevitable conflict that follows its acquisition. The investment of strength may not immediately bring a display of wisdom and judgment. Such attributes are the product of maturer experience. Living develops an understanding of the purposes of life. The struggles of the years of unbalanced powers are too often selfishly directed and obscure the vision of service which is undertaken later with a better understanding of life's purpose and plan. We may be coming just now to this stage of industrial life, and the vision of the opportunity that follows devotion of energies to a common end be about to break upon our sight.

Truth is the important element of real success, and men coming into the employ of the railways are too often surprised when they find that truth on their application blanks is the first requisite to obtaining employment. Where honesty is lacking, efficiency is an impossibility; the whole organization declines. Subterfuge, deceit and jealousies find fertile soil for growth. Responsibility is shifted or set aside.

Suspicion and distrust are today strongly entrenched in many places where they have never before had more than a transient contact. It is not an easy task to overcome at the present time, these influences; because the whole country is shaken as never before, and confidence is not easily restored.

One of the finest examples of co-operative action is found in the human body with its marvelous powers for control. A given part of the brain is devoted to the government of a given function of the body. Besides the intelligence that directs the conscious action, and the mysterious and wonderful performance of the unconscious control, a most important effect flows from the exercise of the heart and affections as they are expressed in personality.

Importance of a Personnel Department

It follows, therefore, that a requirement of primary importance in an organization as large as our railway systems is a department by and through which may be directed the means for the development of a medium similar to that which in life we call personality. Something that may function in the organization along lines that are similar to those that to a large extent enable the individual to make agreeable contact with his fellows and renders him capable of a broad understanding of the circumstances and motives from which action springs and events transpire.

The life of the body is in the blood. The greatest possible care should be exercised, therefore, in the selection of applicants for the service. New life and ideas should freely mingle with the older forms of expression, and leadership must be offered which will bring out the best that is in both.

The topic as suggested largely centers around two questions that are a sort of corollary to the main subject for discussion; namely, a real and permanent improvement in the relations between the workers and the managements.

Other Propositions

The subordinate propositions are: First. What are the fundamental principles involved?—just where to start to develop on sound basis, is the way the question is put. Start with the majestic measure of the Book, "In the beginning God." Here is the common ground, and the only common ground for co-operative effort. The recognition of responsibility to the Supreme Being in the performance of daily tasks is the Great Common Denominator of life. It is briefly and completely covered in the familiar quotation which our late President Harding took as a motto for the ministry of his office. "He hath showed thee, O man, what is good; and what doth the Lord require of thee but to do justly, and to love mercy, and to walk humbly with thy God?" (Micah vi-8). We must make a vital contact between life and the Author of Life, and give it expression in business. This is the first requirement, and it is individual and universal.

The second question is: What methods will bring it about? This is outlined with reference to the subject matter of preceding paragraphs, and the first suggestion is centralized employment.

A centralized employment plan affords a means of stabilizing employment by effecting transfers and promotions from within the company when vacancies occur. Where this plan has been tried it has quickly proven its value also in obtaining a proper knowledge of the flow of new life into the organization and in restraining the growth and operation of selfish tendencies from within.

The stabilization of employment must be emphasized.

* A paper submitted in the *Railway Age's* contest on co-operation.

This can only come through a careful study of the situation by those responsible and a co-ordination of effort to bring about the desired result. Conditions and needs must be anticipated with skill if the real value of the effort is to be realized.

The responsibility of the employees to give dependable service is second only to that of the company to stabilize their employment. To this end good health is a great agency and medical clinics, nursing, housing, etc., where conditions warrant, can be made to contribute in a large degree to the solution of the problem.

Unemployment from any cause means lowered family standards, anxiety, dread, the loss of savings and entering into debt. All these naturally affect the welfare of children and others, and cause dissatisfaction. They are an economic loss which we are morally bound to avoid so far as we can.

In giving employment, an obligation to the community is involved which includes the development of good citizenship. The scope of such activities is almost unlimited and authority commensurate with their importance must support them regardless of where the designated responsibility is placed. A strong feature of centralized employment is the opportunity presented for a comprehensive survey of the field and the selection of men with a due regard for the physical and mechanical requirements of the jobs, which should be so analyzed as to furnish the necessary data for the positions to be filled. Men hired and placed under such circumstances have less fear of failure to give satisfaction and are therefore from a psychological standpoint doubly fortified to give satisfactory service.

Training the Worker for Better Things

The question of subsequent training must also have proper consideration in order that men may increase their earning capacity. It is not sufficient to consider that after the man is enrolled in the organization he can properly be left to his own initiative and such help as he may happen to receive for his further development. He may be unfortunate if thus left to the mercy of circumstances. Advice that is detrimental both to himself and to the company may become a controlling factor in his conduct. Study should be encouraged and means provided for its proper direction through the medium of the supervising officials.

Opportunity for suggestions should be given. There are various methods for giving an employee the chance for self-expression and this is necessary to growth. The methods best adapted to circumstances and conditions should be used; but there is not so much danger of choosing a poor method as of making a poor use of a good one.

Railroads become provincial or departmental in their outlook all too easily and suffer accordingly. It is necessary to secure the widest outlook upon problems—the widest acquaintance with men and the fullest appreciation of the power of personality even in the routine work. The more the worker knows about his own and other jobs, as well as about the company which gives him employment, the better he will become to give intelligent co-operation.

Recreation and Safety

Further interest in his vocation may be aided by a suitable recreation program. This will enlist a wide variety of factors. Grounds must be provided for outdoor sports; buildings for indoor amusements, and the contacts that these requirements make, furnish an opportunity for knowledge outside the immediate environment of the individual.

Intensive safety education and accident prevention work must be carried on and supported by the supervision in a spirit that is convincing and by methods that are inviting. Conference rather than controversy should characterize the safety committee meetings. Discussion should all tend to instruction and better education in the needs, plans

and resources of those involved and others that may be even remotely interested. Understanding the real conditions that are represented in many safety reports would prevent some of them from finding their way to the graveyard. When suggestions are handled by individuals who may have a meager knowledge of what is involved the result is unfortunate. This phase of the work needs careful attention as the rank and file usually know what they don't like and what conditions and practices precipitate personal injury or involve hazards that should not be permitted to exist.

The safety work provides a point of contact that is immediately recognized by every individual. The only question that can uncover a difference of opinion is the one which relates to the means for securing the desired result. Here, too, it is easy to reach an agreement if we approach the subject in the spirit that we have declared to be essential. This is the only way in which we should attempt to deal with any of the problems that affect human life and happiness.

Discipline and Promotions

Discipline should be meted out not after hard and fast rules but in a manner consistent with the conditions surrounding the case. To make the punishment fit the criminal rather than the crime is the general way in which discipline must be handled. There may be exceptional cases when the punishment should be made to fit the crime—but it will not be often that this method must be invoked.

To provide a proper background for promotions, there must be an adequate method of handling examinations, and the various examiners should be enrolled under one head, if the most unbiased action and contacts are to be maintained. Promotions should not be made without the backing of proper experience, and should be based upon merit and fitness not on family, fraternal or similar relations and reasons. Those who receive promotion should develop their powers of leadership along approved lines, which involve the idea of leading rather than that of driving to secure results.

Demerit Marks Should Not Exceed

Merit Marks So Greatly

Some further means should be found for conveying appreciation for faithful and efficient service, as it is evident that not all who may be capable of bearing the increased responsibilities which promotion involves are the recipients of that recognition. The use of a merit system of marking would supply a need in this direction. It has always been understood that demerits were much more frequently passed out than merit marks, and yet if the individual records of employees were scrutinized as carefully as they might be to discover cause for giving merit marks, a valuable addition to our program for developing efficiency would appear.

"Employees' Service"

Another feature of our program must include what may be called employees' service. Nothing should be undertaken in this line, however, that is considered as a part of a man's wages, the idea rather being to conserve the proper balance and secure that which is right and fair between management and men. One means of interesting employees in their work is a suitable suggestion plan. This should give all employees the opportunity for frank and free expression in connection with administration, economy of operation, design or construction of product. For suggestions found practicable and adopted an award should be paid the originator based upon the saving resulting from his suggestion.

Finally we should have some attractive method for giving publicity to our effort. This can be accomplished through the medium of a good employees' magazine. There is no acceptable substitute, and the possibilities that lie within its

power are only measured by the sincerity of the effort to be what you wish to seem.

The promotion of efficiency is really concerned more with the art of living than it is with the science of material development. Where this is left out of the problem, the computation fails to produce results than even approximate an accurate answer because so great a factor has been omitted in working it out.

Publicity, confidence, conference are the elements of success. When these are spontaneous almost any program that would be chosen will give good results; without them none will be even moderately successful.

Industrial progress depends upon the men who handle the material, the clerks who handle the records and the men who sell the product, which with the railways is transportation. Personal contact and acquaintance with individuals and conditions can go a long way toward smoothing the wrinkles that will from time to time become apparent.

The proper direction and control of the human factor is generally regarded as the most difficult problem of management. Application of scientific methods to this problem will yield highly beneficial results.

What Sort of Environment and Work Does the Average Man Want?

The use of scientific methods, however, does not mean an attempt to make men into machines as some seem to fear. It should lead to the elimination of human maladjustments which mean not only dissatisfaction to the worker but an economic loss to him and to society as well. What kind of a life and what sort of environment and working conditions does the normal man want? These are the fair questions that enter into the problem.

A department which should function as a special faculty for keeping in touch with the human side of the problem of business management has a field for operation that is of first line importance, and touches every other effort with the spirit and purpose of its existence. To the extent that this can be accomplished the answer to the question about co-operation and efficiency will appear.

The varied conditions with which the different railways have to contend make it impossible to describe minutely a plan that can be of general use. Many companies can and should encourage the investment of money in their securities while others are not in a position to offer dividend paying investments, and speculation thrives best where co-operation yields most to competition, and competition in its last analysis is warfare.

It is not so much the plan as it is the spirit that is behind it that is the great need, and the spirit that is behind it must also permeate completely the various departments, and mold their relationship and activity.

Life is a unit. The spirit of strife and competition must be eliminated if co-operation is to reign within its domain. Co-operation may barely survive in the isolation of some small department of the organization or scattered in meager groups throughout its confines, but to be effective it must have its source at the fountain head. It will gather inspiration and power from the contributions it receives as it is handed down through the various grades of authority, or it will become atrophied and impotent by this process. The management is interpreted to the man in the ranks very largely by his contacts with his immediate superiors. If he does not find at this point the assurance that he has a right to expect, he is very likely to conclude that the company deserves about what it measures out of this invaluable element of success; and the spirit of co-operation will exist only in sporadic expressions of life.

But if on the other hand the spirit of co-operation is a marked factor in the dealings the railways have with each other and with the public, and the program which the man-

agement designs and authorizes to promote this spirit among the men, shows strength rather than weakness, as it is passed into their hands, there is little danger of failure beyond if the principles and suggestions we have tried to outline are expressed in the authorized design.

I. C. C. Divided on Certificate for New Line

WASHINGTON, D. C.

AN INTERESTING interpretation of the law relating to the issuance of certificates of public convenience and necessity for the construction of new lines of railroad has been given by the Interstate Commerce Commission in granting a certificate to the Wenatchee Southern for the construction of a line between Wenatchee, Wash., and Kennewick. Five of the eleven commissioners dissented from the report, which holds that though apparently the earnings in prospect will be insufficient for some time to sustain the project as an independent enterprise, the question of probable earnings is not controlling when the sponsors are willing to undertake the risk and that the commission's primary responsibility in such cases is to determine the public interest involved. The proposed construction is from Wenatchee to Beverly Junction, 53 miles, and from Hanford along the west side of the Columbia river to a connection with the Oregon-Washington Railroad & Navigation Company line about 5 miles west of Kennewick, and it is proposed to use trackage over the Hanford branch of the Chicago, Milwaukee & St. Paul between Beverly Junction and Hanford and over the Oregon-Washington for the 5 miles into Kennewick.

Opposed by Great Northern

The Great Northern opposed the application and the Washington Department of Public Works appeared in support of it. The bases for the application were that the Wenatchee district, now served only by the Great Northern, needs a direct and open connection with other transcontinental lines, and additional routes to and from Pacific coast points; that the territory between Wenatchee and Kennewick is in need of transportation facilities; and that the northern and southern portions of central Washington need more adequate railroad connection. In opposition, the Great Northern urged that its facilities are, and in the future will be adequate to the needs of the Wenatchee district; that the proposed connection with other transcontinental lines would not improve transportation facilities in the Wenatchee district; that no appreciable development would result from the construction; that the prospective traffic does not warrant the expenditure necessary, and would not support the road after construction; and that the proposed line would unnecessarily deprive it of traffic for which it has made adequate provision.

The primary purpose of the project is to provide additional facilities to move apples from the Wenatchee district.

While no definite financial plan has been adopted, the tentative plan contemplates financing the construction cost by an issue of bonds in the principal amount of \$3,500,000, bearing 5 per cent interest, and by the sale of capital stock. The proposed bond issue is but slightly less than the applicant's estimated cost of construction. Steps have also been taken to obtain guaranties from the growers of fruit in the Wenatchee district to meet any deficit in operation and interest on the investment for a period of three years. The plan, largely voluntary on the part of the growers, is for the guarantors to pay 3 cents per box on the marketable apples produced, in addition to the freight rate, the amount to be

deducted by the selling agents and held as a fund for the purpose stated.

The Majority Opinion

The majority opinion says in part:

As the prosperity of the Wenatchee district is almost wholly dependent upon the successful marketing of its apple crop, the district requires to an unusual degree transportation facilities and service of a very high order. For whatever reasons, it is clear that the facilities and service have not in the past years measured up to that standard with any marked degree of consistency, at times to the great embarrassment of the industry. This is not to say that the Great Northern has not, in general, done as well as other northwestern carriers. The service rendered the Wenatchee district in 1923 as disclosed by our records represents, on the whole, transportation as adequate as the shippers could reasonably ask. The outlook for the 1924 crop movement is also good. The arrangements made in 1923 by the Great Northern for a better refrigerator-car supply have been detailed above. The proposed line of railroad, though dependent for refrigerator equipment upon its connections, would bring to Wenatchee station and Malaga an additional service, and to the extent that it lightened the Great Northern traffic at those points would correspondingly benefit stations north and west of Wenatchee served only by the Great Northern.

The problems in convenience and necessity cases have been intensified by uncertainty as to how the law should be interpreted. Apparently the earnings in prospect for the applicant will be insufficient for some time to sustain the project as an independent enterprise. Ability to earn is not the sole test of public convenience and necessity, although always a factor to be given consideration. When such ability is shown to exist a strong presumption may arise that public need for the new facility exists. When not shown to exist it may frequently be concluded that such need is too slight to warrant the expenditure necessary for the proposed construction. When it is established, however, that a project will render important public service, and its sponsors are willing to assume the risk of loss in the expectation of ultimate gain either directly through the property or indirectly through benefits to themselves and to the shipping community, the requirements as to the public interest may be fully satisfied, although losses to investors seem more probable than gains. We are to consider what is best in order to foster, build, and make efficient transportation facilities as a whole in the interest of the greatest number. Where only the private aspect is involved, individuals are at liberty to take risks. So far as the public is concerned, the advantages of new or better service may be so great as to justify increasing the burden upon shippers generally by the amount necessary to sustain the facility. If it should prove later, however, that the line, because of competitive conditions, lack of business, or other circumstances, can not be operated profitably under fair divisions and fair rates, the burden of the loss would properly fall upon the investors and not upon the shipping public.

Our approval of a new enterprise neither constitutes nor requires a finding that such enterprise will prove successful. Our responsibility is to determine the public interest involved in the construction of the line. The history of railway construction illustrates that prospective tonnage depending for its development upon transportation facilities, rather than tonnage immediately in view, has been the main justification for railway construction. Progress has involved risks. It is not to be presumed that the Congress contemplated discarding, as insufficient, conditions which in the past have furnished the warrant for a constructive policy in the upbuilding of the system of transportation. It is rather to be presumed that the Congress did not contemplate an interpretation of its enactment which, applied as a policy in the past, would have prevented the construction of many railway properties now serving the public interest in an important way. Prospective earnings or losses may properly be considered as one of the factors evidencing the public interest, but, taken alone, do not determine whether a particular enterprise is or is not required by public convenience and necessity.

Financial Aspect Considered

The significance of the financial aspect may vary in different cases. Certainty of failure to earn may have effect different from uncertainty of earnings or as to the time when they are to be realized. A prospect for earnings not free from uncertainty may justify the granting of a certificate permitting the construction of a line, the subsequent abandonment of which may be authorized on demonstration of futility of the prospect. Cases must be determined by the particular facts presented regarding them, and it is not possible to state a rule applicable alike to all. Circumstances may warrant the drawing of final conclusions regarding the financial aspect before the issuance of a certificate authorizing construction, or, conversely, may justify deferring such consideration.

Important and growing industries on the line proposed are shown to require efficient transportation. Notwithstanding all that may

be said favorable to the Great Northern and its present service, it has failed at times to meet demands made upon it. Advantages to shippers of an additional outlet for their product is apparent. The perishable nature of the apple crop and the conditions under which it is marketed render it desirable that transportation facilities of the highest order be available to shippers at Wenatchee and vicinity. The assurance of access to lines other than the Great Northern at the critical periods in the crop movement is a factor of prime importance to such shippers and clearly is in the public interest. It is probable that the competition afforded would stimulate the Great Northern to further improve its service. Competition, within reason, rather than monopoly, is in the public interest. It would seem that a more pronounced policy of co-operation and co-ordination upon the part of connecting carriers, designed to make their transportation facilities available to the greatest possible number of shippers, would prompt the construction and operation of the project by such carriers as a joint facility. Whether or not such carriers will benefit sufficiently by the construction of the line to be willing to take part in its construction or to assist those who now propose to build it, we conclude that public convenience and necessity require its construction.

Questions as to financing the proposed construction and the character of securities to be issued are not now before us. They will be considered when appropriate application is made under section 20a of the act.

Upon the facts presented we find that the present and future public convenience and necessity require the construction and operation by the applicant of the line of railroad in Chelan, Kittitas, and Benton Counties, Wash., described in the application.

We further find that the matters of record justify the granting of permission to retain excess earnings.

Dissenting Opinions

Commissioner Aitchison, in a dissenting opinion subscribed to by Commissioners Hall, Meyer, Esch and Lewis, said in part:

I have little doubt that eventually, with the further development of the territory outlined in the majority report, and because of the needs of national defense, which, however, we have no direct means of meeting under the interstate commerce act, a railroad should be and will be constructed along the Columbia river substantially as located by the projectors of this line. But we are not considering that general question now; the immediate question is whether the application to construct a particular railroad, which has been described in much detail in the record, is or will be required by the public convenience and necessity. It is practically certain that the line as proposed could not for a considerable number of years meet its operating expenses and capital charges. In addition, the plan for financing construction is indefinite and of questionable soundness. For the evident purpose of keeping the construction and operation expense to a minimum, the plans submitted have been cut so that the plant and operating arrangements projected do not seem ample to carry the traffic, and particularly the peak traffic, which admittedly is the principal reason for the new railroad.

Earnings Should Be Considered

Though a demonstration that success would attend a projected railroad enterprise is not indispensable to the grant of a certificate authorizing construction, the prospective earnings are a consideration of weight in determining the relative public convenience and necessity involved. The likelihood of continued loss is cogent evidence that the public interest does not require the proposed facilities. A long-continued inability to meet expenses and fixed charges might well lead to impairment of service or complete failure to meet the requirements of the public through bankruptcy and receivership or through actual abandonment of the line, with attendant losses to investors who might have placed some reliance upon our certificate. The greatest burden, in the event of failure, generally falls upon those who invest in homes, business enterprises, schools, and churches along the projected line. These people are likely to lose everything while investors in an abandoned railroad lose only their investment in an enterprise which they knew to be speculative.

But during the life-or-death struggle the expense of operation, including maintenance, must be met by somebody. If not met by the shippers over the projected line, it will fall, directly or indirectly, upon shippers over connecting lines, or else impair to that extent the ability of those connecting lines to serve their patrons. This burden should not be laid upon the public unless there is reasonable assurance that the public benefit to result from construction and operation of the projected line will at least offset the public burden. Such assurance is not given upon this record, nor is it to be found in exposition of general views, not shared by all of us, as to what matters may be considered seriously upon applications for certificates.

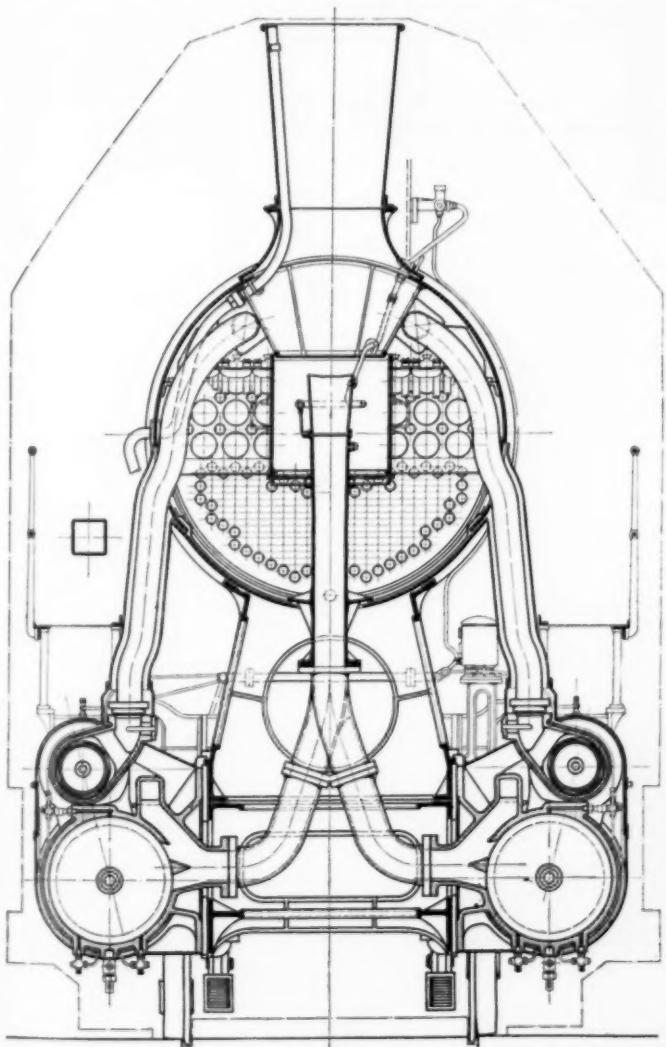
A Successful Unaflow Locomotive Is Built

Recent Tests Show That a Considerable Saving in Steam and Coal May be Expected

By Prof. J. Stump
Privy Counsellor, Berlin, Germany

TH E FIRST LOCOMOTIVE in which the unaflow principle was applied was a superheater freight locomotive of the German State Railways, was built in 1920 by A. Borsig, Berlin. This locomotive did not prove to be a success and after operating about three years the cylinders were replaced by those of the usual type. The cylinders first used for the unaflow installation were notable for

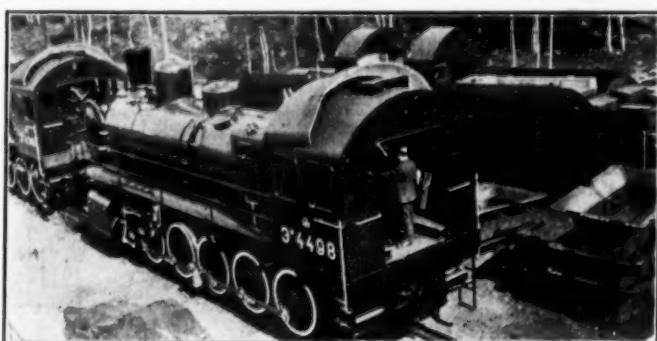
unaflow locomotive was more economical than the compound for small loads, while at higher loads its fuel consumption was higher than that of the latter. This was easily explained



Cross Sectional Elevation Through the Smokebox Showing the Arrangement of the Cylinder Exhaust Pipes

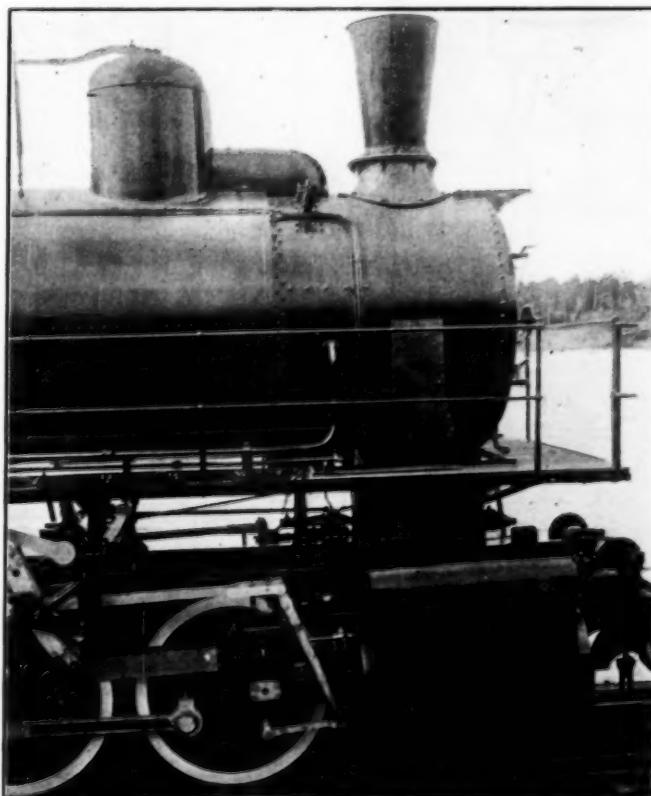
compactness, lightness and simplicity. This was due in part to the use of horizontal, single-beat poppet valves which were employed for the first time on this locomotive. This type of valve, although simple and perfectly steam tight, was not favorably received because of the high lift and large force required to raise it. The cylinder bore of this locomotive was 24.8 in., with a stroke of 26 in. and it operated at a steam pressure of 177 lb. per sq. in.

The results of tests made at that time showed that the



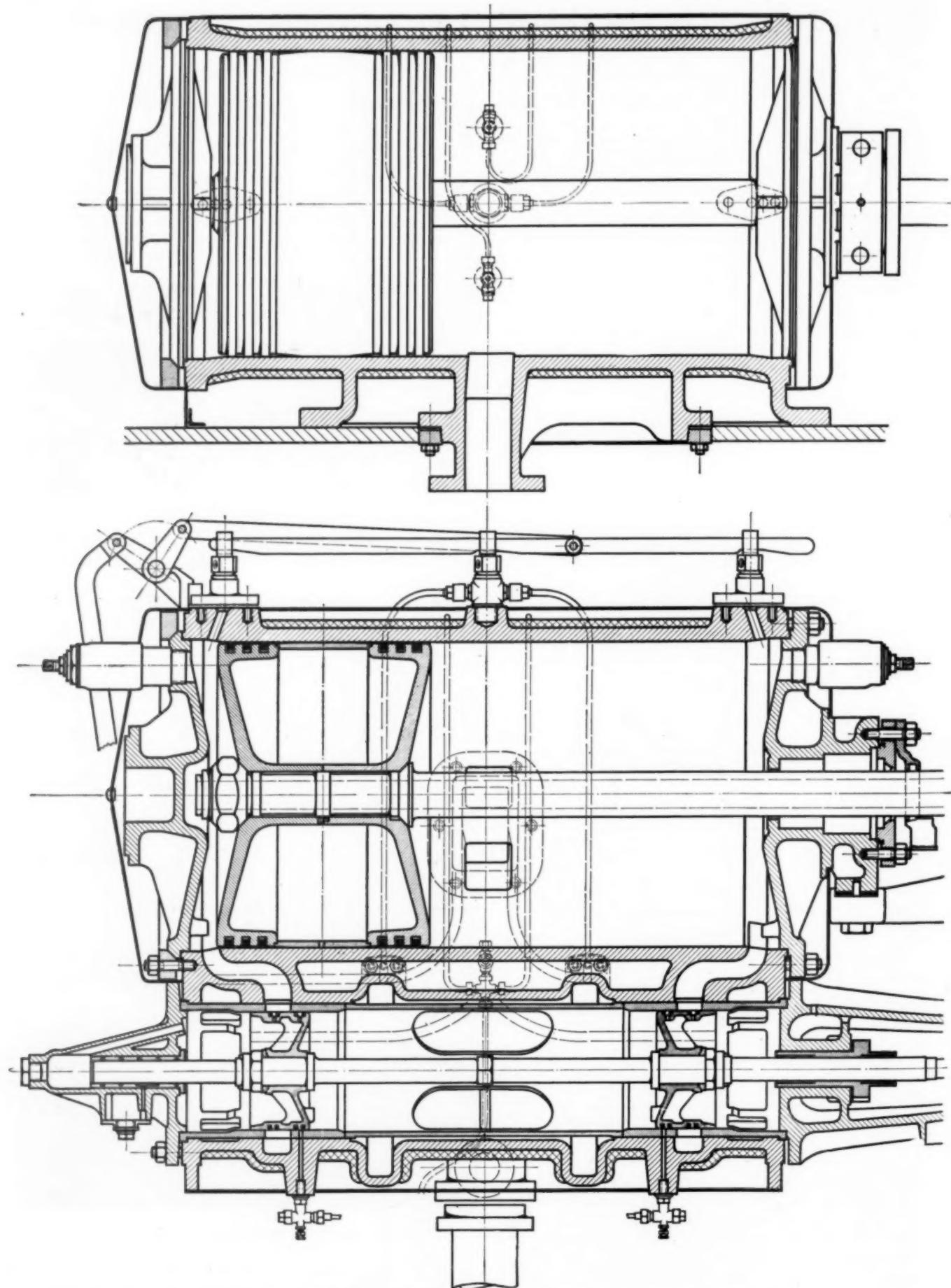
The 0-10-0 Unaflow Locomotive Built by Nydquist & Holm, Trollhättan, Sweden, for the Russian Government

by the fact of the long, constant compression and the large clearance volume. The unaflow locomotive working with



The Front End of the Russian Unaflow Locomotive

saturated steam showed in general a higher economy than the compound except at long cut-offs. It was concluded, at that time, that the future line of progress of the unaflow



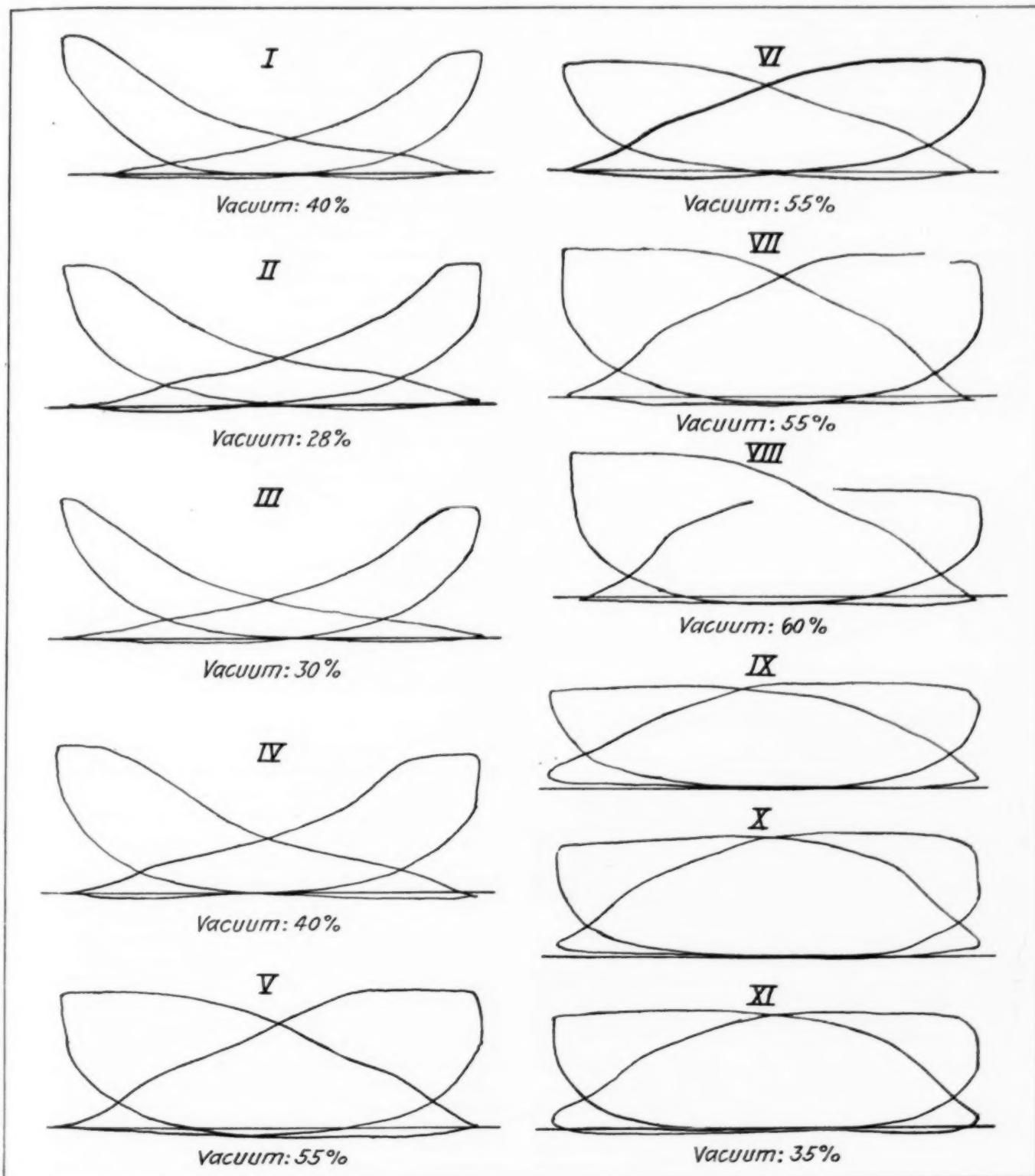
Sectional Drawing Showing the Construction of the Cylinders

locomotive led naturally from the two cylinder to the three cylinder engine with cylinders having small clearance volume, to the use of single-beat poppet valves and the utilization of the ejector action of the exhaust, in combination with high pressure and modern superheat.

To engineers of broad vision, unsuccessful experiments are successful if they reveal the way in which success may be sought. So it was here. The exhaust ports in the cylinder wall, which are formed like a nozzle of a steam turbine,

transformed the energy of the "lost toe" of the indicator card into speed energy, which withdrew residual steam from the attached single exhaust pipe. A vacuum of 60 per cent was created in this pipe, leading from the cylinders to the ejector, thus utilizing this energy, represented by the "lost toe," for creating the vacuum.

Fig. 2 shows an indicator diagram taken from the single exhaust pipe. This test was a complete success as it showed that on account of faulty connection between the cylinder and



Indicator Cards I to IV Inclusive Are Taken at Low Speeds; V and VI Are Taken at High Speeds and VII and VIII Are Taken at Medium Speeds; Cards IX, X and XI Are Starting Diagrams

the evacuated exhaust pipe, the vacuum did not penetrate into the cylinder. The locomotive was of the pure unaflow type and it was discovered that the exhaust ports in the cylinder were closed too soon by the piston. Also the single beat valves did not prove to be a success on account of the fact that the crew failed to adjust the gear properly. However, this engine revealed the method by which success was to be expected.

The single beat valves were replaced by a positively controlled piston valve allowing for an additional exhaust which partially followed upon the main exhaust controlled by the piston. This design permitted the main exhaust nozzle to transform the pressure energy represented by the "lost toe" of the diagram, which is shaded in Fig. 1, into speed energy, so as to withdraw the residual steam from its own and of the other cylinder through the additional exhaust established

economy at early cut-off and the semi-unafow at late cut-off. This contrast is more favorably intensified by utilizing the lost part of the diagram to create vacuum at late cut-off. The output and economy of the locomotive will be

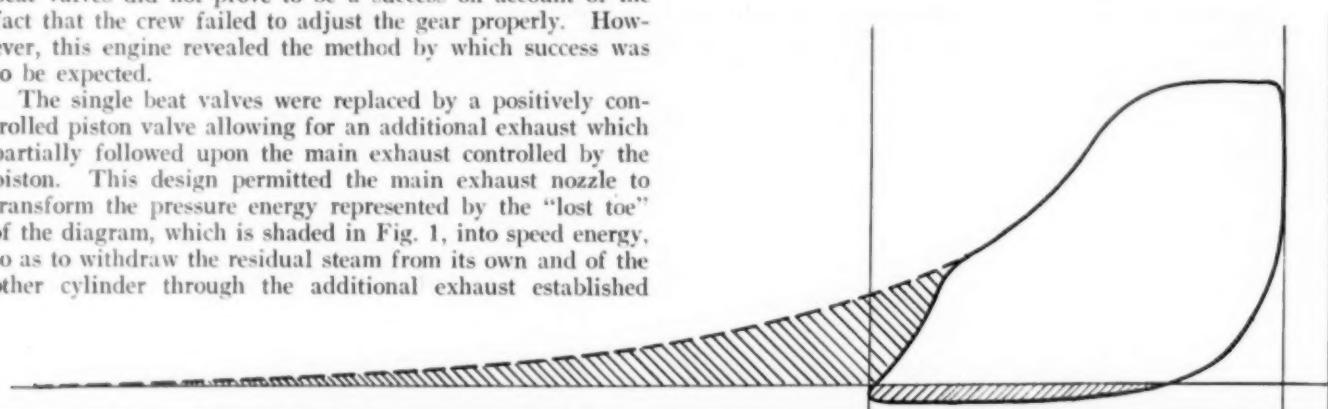


Fig. 1.—A Theoretical Indicator Card in Which the Shaded Area Below the Atmospheric Line Shows the Gain in Pressure Energy Exhaust Ejector Action

by the piston valve. The gain thereby effected is shown by the shaded area below the atmospheric line in Fig. 1 which corresponds to the results from actual indicator cards with about 60 per cent vacuum.

Design of the Cylinders and Exhaust Pipe

The design of the cylinders and exhaust pipe is shown in the drawings. Particular attention is drawn to the elongated type of the unaflow cylinders and pistons. The main nozzle-like exhaust ports are opened by the piston at 25 per cent of the piston stroke before the next dead center. No extended piston rod is used. Live steam is admitted to the cylinder from the inside of the piston valve in the usual way, the outer ends establishing an additional exhaust which joins the main exhaust immediately at the cylinder wall by ports cast in the wall. The exhaust lap of the valve is equal to the inlet lap, thereby delaying the additional exhaust which follows the main exhaust. This tends to effect a nearly pure unaflow at early cut-off and a semi-unafow at

largely increased if the back pressure of about one atmosphere, with which American locomotives are frequently worked, is replaced by a vacuum. This is all the more noticeable since the unaflow system shows its beneficial thermal effect especially the larger the drop of temperature

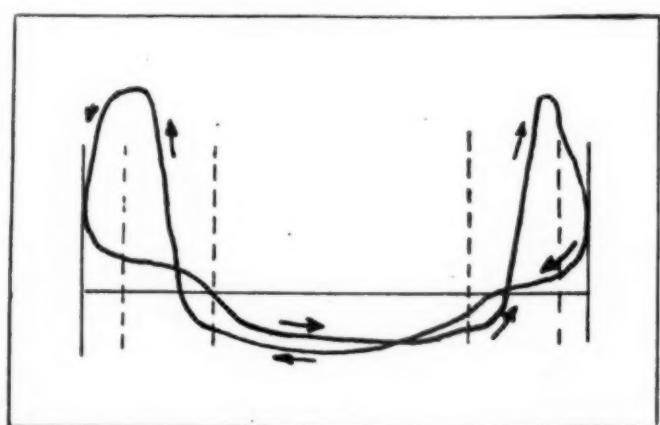
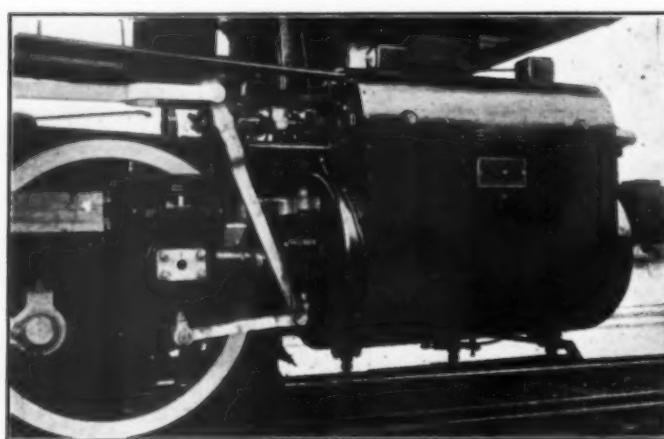


Fig. 2.—Indicator Diagram Taken from a Single Exhaust Pipe

in the cylinder. The boiler will be more able to furnish the required steam, the capacity of the locomotive will be increased and in a great many cases the necessity to use a mechanical stoker will be dispensed with.

Effect of Uniting the Cylinder Exhaust Pipes

After the union of the three exhausts of each cylinder both united exhaust pipes become a combined ejector, so that the exhaust of each cylinder evacuates the other. By this arrangement the speed energy of one cylinder will evacuate its own cylinder as well as the other, the active steam thus mixing with the passive steam at two places and equalizing the speed of the steam through the exhaust pipes to a large extent. This equalization is continued in the nozzle which transforms the speed energy into pressure energy, thus utilizing any remaining energy that may be left from the exhausts. The result is a fairly equalized flow of steam from the mouth of the nozzle, which tends to create a uniform draft upon the flue gases, resulting in good combustion and a good production of steam. There has never been the slightest complaint about lack of steam.



The Locomotive Is Equipped with a Walschaert Valve Gear

late cut-off. This is an satisfactory result as there is practically no loss at the end of the diagram at early cut-off which shows there is no need for an additional exhaust at this point and as there is considerable loss at the end of the diagram at late cut-off there is consequently a need there of an additional exhaust. Furthermore, when working with atmospheric exhaust, the pure unaflow shows greater

Further examination of the results in testing this peculiar suction exhaust showed a surprisingly low vacuum in the smoke box, that the fireman carried an unusually light fire, that there was little surplus air and a relatively small amount of carbon monoxide. There was also considerable moist steam at the mouth of the stack which showed that the steam was performing an increased amount of work. This increased work is shown in Fig. 1 by the shaded area below the atmospheric line, which, however, amounts only to 14 per cent of the lost work represented by the shaded area above the atmospheric line. It also showed that the suction exhaust was working with an extremely bad efficiency, which opens the prospect of realizing a much better vacuum if proper measures to that end are taken. In fact a vacuum of 80 per cent should be easily attainable. This design can be improved in a great many ways; for example, the spider placed in the mouth of the nozzle should be removed in order to give more area for the exit of the flue gases.

Construction of the Cylinders

Referring to the sectional drawing of the cylinder it will be noted that the prolongation of the cylinder and piston is remarkably small due to the large advance in the exhaust of 25 per cent, which increases the lost area of the diagram in Fig. 1 to a large extent. The bull ring inserted between the two piston heads carries the piston. No hard bushing is used in the cylinder itself. The clearance space is 12 per cent, which could be reduced to quite an extent if blowing of the cylinder safety valves is resorted to at very early cut-offs. Referring to the drawing of the indicator cards, a vacuum of from 28 per cent to 40 per cent is obtained at 20 per cent cut-off, thereby compensating for the long compression entailed by the large exhaust lap of the piston valve. At 30 per cent cut-off a vacuum of 40 per cent is obtained, while at 50 per cent cut-off the tests showed from 55 per cent to 60 per cent vacuum. The last three cards shown in the drawing are starting diagrams, taken at 70 per cent cut-off. The time between exhausts is so large that the returning air pressure destroys the vacuum, but it will come up as soon as the speed is increased sufficiently, as is shown in the last card. The speed, of course, is an important factor in this peculiar process of producing a vacuum and obviously a three-cylinder locomotive will be more adaptable to produce a vacuum, which in this case may be termed a mechanical vacuum.

A general idea of this locomotive may be obtained from the illustrations. It is an 0-10-0 type equipped with a standard Walschaert valve gear, which in this connection has some bad features. In spite of these bad features, however, a considerable saving in steam and coal may be expected.

It is left to the reader to imagine what field is available for the condensing turbine locomotive if there should be a vacuum produced with the unaflow system, for a medium and long cut-off, equal to that of a turbine locomotive equipped with a condensing device. This question may be raised to good advantage, especially in America, where a long cut-off is commonly used.

THE "NAVY" of the Pennsylvania Railroad is the subject of a pamphlet which has been issued from the general office of the company, Philadelphia, containing a sketch, with numerous illustrations, of the 75 car floats used in the New York harbor, the numerous barges and other vessels used in Hampton Roads, and various other craft, 438 in all, owned by this company. The frontispiece is a picture of Captain B. B. Gandy, pilot on the ferry boats between Philadelphia and Camden who has made a million trips across the Delaware River. The boats of this ferry, in the rush hours, run every two minutes.

An Abuse of Refrigerator Cars*

By E. C. Calkins

Superintendent of Equipment, Fruit Dispatch Company

FOR MANY YEARS the Fruit Dispatch Company has been giving close attention to refrigerator car equipment in order to assist in the work of insuring good delivery of bananas to its consignees. Great progress has been made in recent years in design, construction, repair and upkeep of the present standard refrigerator cars and most of the recently built cars have left the shop as fine examples of good workmanship and material.

When a first-class refrigerator car of this character is put in service it should have proper use and upkeep in order to maintain its efficiency. One of the principal difficulties which has occurred in maintaining the efficiency of refrigerator equipment has been due to the penetration of the floors by moisture. This condition converts the floor insulation into a heat conductor and results in decay. Owing to the analysis of equipment troubles made by the Fruit Dispatch Company a campaign was started to prevent ice bunker leakage penetrating the floor structure by the introduction of heavier ice pans and by waterproofing a partition transversely within the floor under the ice box bulkhead. Almost all modern equipment is now protected by heavier gage ice pans which in many instances are made of copper bearing metal to further resist corrosion. The old-time ice pans, made of 18 to 22 gage galvanized iron, failed after two or three years' wear and replacement did not cure the trouble which had already occurred through leakage of ice meltage into the floor structure under the bunkers and thence into the insulation beneath the lading space.

All car designers and builders give great care to the floor structure, which is recognized as a very important and expensive part of the car, yet today car floors are being rapidly ruined in the best equipment by unfair usage which is as unwarranted as it is incomprehensible in the light of common sense and good judgment.

Transportation companies today, with full knowledge, are delivering good modern equipment to shippers who place ice in and on the packages of lading and who demand good cars for this purpose. While this practice is more or less general, we give two illustrations of its extent. In one district, during the lettuce season, which begins about December, there were 6,129 cars shipped up to March 4; 5,900 of these were iced on the load outside of the bunkers. In New Orleans the present writer found that between April 1 and April 12, 1924, 800 cars of one particular line were submitted for banana service and that 35 per cent of these cars had wet floors, due to icing on the load. In the latter case it was observed that in nearly every instance water was dripping through along the side, over the sills and under the sheathing, and that leakage occurred through other parts of the floor as well.

The conditions described are apparent season after season to greater extent in widespread vegetable shipping districts. Every year more and more good cars are being rendered inefficient by wet insulation and less durable through decay. The refinements of design, workmanship and material which have been wrought into the refrigerator car structure by the highest technical skill are answered with unreasoning and gross abuse.

It is this equipment, rendered inefficient through unfair usage, which is largely offered to other shippers in winter, and which in banana service requires unusual, expensive protection with straw and paper and long preheating to meet the danger arising from a prevalent concealed defect.

In years gone by beer was shipped with ice placed on top

* An article which appeared in the May issue of *Fruit Dispatch* and recently re-issued in the form of a reprint.

of the kegs representing exactly the same practice which is now in vogue with lettuce and some other vegetables insofar as the effect of melting on the floor is concerned, yet the beer shipments were made in cars set aside for that purpose, known as "beer and ice cars," it being recognized that the service was unsuited to good equipment. The argument is put forward that tremendous savings are made in contrast to the old system of icing in bunkers, but we contend that this fact does not warrant the present abuse of equipment and that the necessity of a small percentage of the total shipping should not be permitted to cause this serious general deterioration in refrigerator cars.

The matter is an important one and we believe that the transportation companies and car companies should view the facts squarely and act upon them. It is their investment which is suffering from material destructive loss at a rate out of all proportion to the earnings on iced lading. The shippers and receivers in general bear the losses of resultant inefficiency in service and are entitled to protection.

Freight Car Loading

WASHINGTON, D. C.

REVENUE FREIGHT car loading during the week ended August 9 showed a reduction of over 3,000 cars as compared with the preceding week's figures, but the total, 942,198 cars, was only 31,552 cars less than that for the corresponding week of last year, when there was a reduction at the time of President Harding's funeral. As compared with 1922 there was an increase of 99,508 cars. Loading of grain and grain products, merchandise and miscellaneous freight showed increases as compared with that of last year, as did that of the Pocahontas, Southern, Central Western and Southwestern districts, while the principal decreases as compared with last year were in coal and ore. Coal loading, 149,482 cars, was however, somewhat heavier than it has been in previous weeks.

The freight car surplus for the week ended August 7 had been reduced to an average of 296,496 cars for the railroads of the United States. This included 138,325 coal cars and 123,344 box cars, and was a reduction of 26,034 cars as compared with the preceding week.

For the Canadian roads the surplus was 28,350 cars, including 24,475 box cars.

The summary of loadings, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING, WEEK ENDED AUGUST 9, 1924

	1924	1923	1922
Districts			
Eastern	218,312	225,364	195,195
Allegheny	192,855	208,004	174,561
Pocahontas	43,719	42,745	29,192
Southern	131,639	127,333	108,913
Northwestern	137,057	167,724	147,258
Central Western	149,835	140,361	135,336
Southwestern	68,781	62,219	52,235
Total Western districts	355,673	370,304	334,829
Commodities			
Grain and grain products	57,616	46,188	57,318
Livestock	29,061	30,246	28,425
Coal	149,482	177,267	82,898
Coke	6,826	12,936	8,415
Forest products	67,351	73,449	55,651
Ore	53,654	81,827	69,458
Misc., i.e.l.	239,715	227,884	230,613
Miscellaneous	338,493	323,953	309,912
Total	942,198	973,750	842,690
August 2	945,731	1,033,466	842,663
July 26	925,859	1,041,415	848,858
July 19	930,284	1,029,429	845,548
July 12	910,415	1,019,809	850,676
Cumulative total, January 1 to date	28,601,136	29,953,453	24,957,727

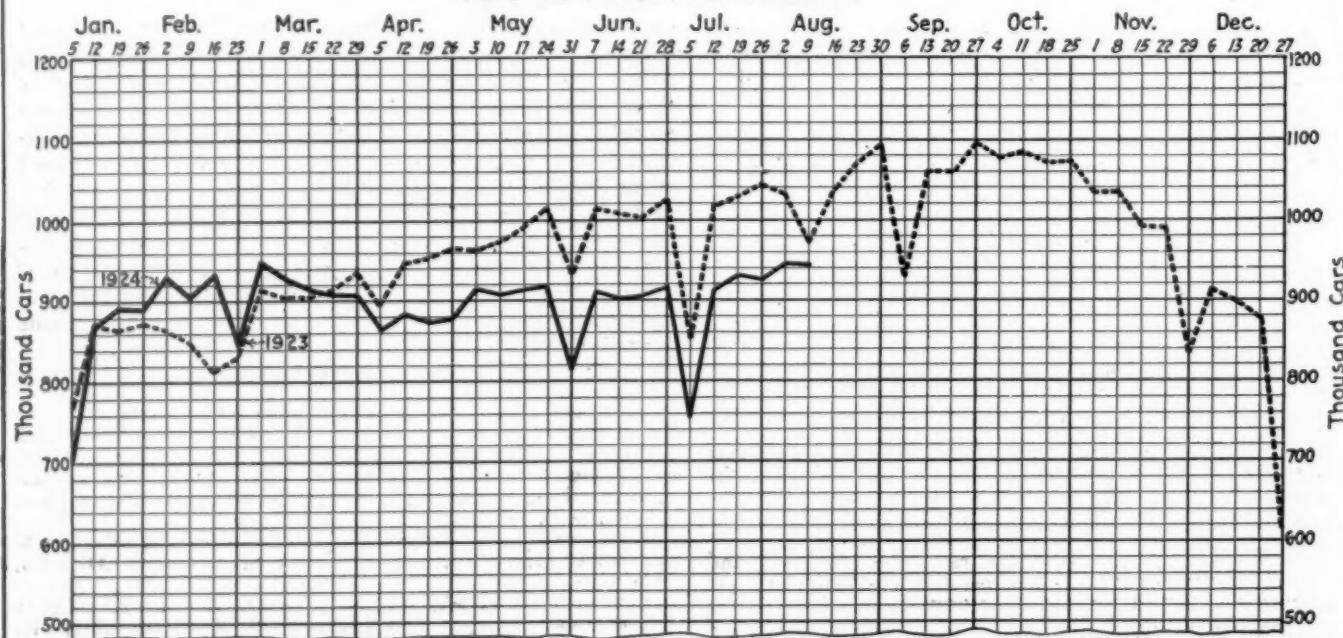
Car Loading in Canada

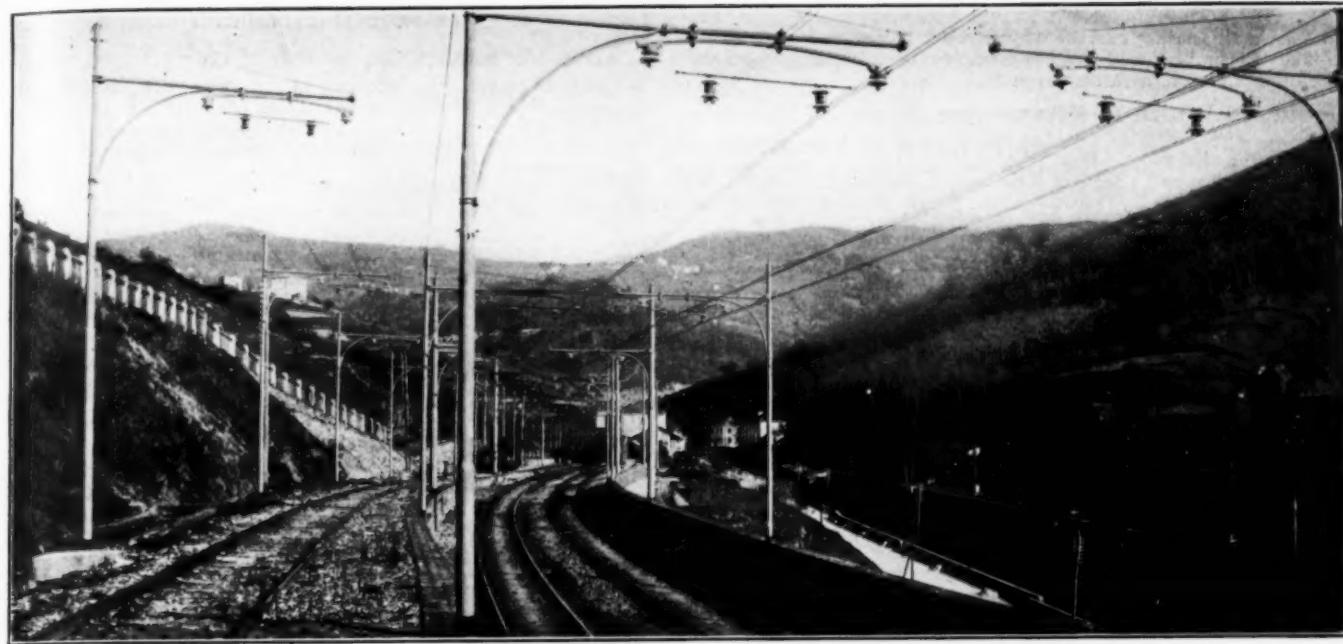
Revenue carloadings at stations in Canada for the week ended August 9 aggregated 47,239 cars, a decrease from the previous week of 1,638 cars. Coal loading was heavier in the Eastern division by 1,115 cars, but other commodities showed only slight increases or decreases. In the Western division grain loading decreased 262 cars. Compared with the same week last year loadings were lighter by 3,252 cars.

For the week ended 1924

Commodity	July 26 Cars	Aug. 2 Cars	Aug. 9 Cars
Grain and grain products	4,279	3,701	3,469
Live stock	2,149	2,147	2,047
Coal	5,022	4,671	5,837
Coke	176	151	130
Lumber	3,534	3,638	3,540
Pulpwood	2,059	2,048	1,671
Pulp and paper	1,765	1,706	1,725
Other forest products	2,160	2,201	1,943
Ore	1,485	1,412	1,253
Merchandise, i.e.l.	15,005	15,129	14,590
Miscellaneous	12,002	12,073	11,034
Total cars loaded	49,636	48,877	47,239
Total cars received from connections	27,564	27,540	27,475
Total cars loaded for corresponding week, 1923	51,366	51,522	50,491
Cumulative loading to date—1924	1,701,022	1,701,022	1,701,022
Cumulative loading to date—1923	1,589,798	1,589,798	1,589,798

REVENUE FREIGHT CAR LOADINGS





Electrified Section of the Italian State Railways Near Genoa

Electrification Progress and Power Supply

Status of Railroad Electrification in Various Countries Presented at First World Power Conference

LECTRIFICATION of railroads was given a prominent position at the First World Power Conference recently concluded at Wembley, London, England. The purpose of the conference was to consider how industrial and scientific sources of power might be adjusted nationally and internationally, (1) by considering the potential power resources of each country, (2) by comparing experiences in the development of agriculture, irrigation and transportation, (3) by conferences of engineers, (4) by consultations of power consumers, (5) by conferences on technical education, (6) by discussions on the financial and economic aspects of industry, and (7) by conferences on the possibility of establishing a permanent world bureau for the collection of data. Brief abstracts of the several papers presented on electrification follow:

Electrification of Railways in Norway

By H. J. Schreiner

Chief Electrical Engineer, Norwegian State Railways

Considering the railway problem and especially the electrification of the Norwegian railways, one has to bear in mind the particular features of the country.

The area of Norway is equal to that of the British Isles, and the country is for the greater part very mountainous. Its total length is several times the length of England and Scotland together, as the distance from "North Cape" to its southernmost point is more than 1,250 miles. On this area there live only about 3,000,000 people. It is therefore easily understood that there are great technical as well as economic difficulties in the way of building railways in Norway. The mountains and tunnels make the railways expensive and the rather small traffic makes a profitable railway the exception.

It has therefore never been attractive to private enterprise

to build railways in this country, and the state has for the greater part been compelled to do it, putting the expenditure on the tax-payers. For this reason there are still relatively few railways in Norway. The total length of line is at present about 2,200 miles, the miles track about 2,600.

For many years to come the state authorities will have to concentrate their efforts on building those main lines that are still wanted, and at the same time on trying to reduce the operating cost of the railways built. Here, the nature of the country may be of assistance. Norway is, as is well known, one of the countries where water power is most abundant; on the other hand it has no coal mines. The waterfalls are often situated close to the railway lines. It is therefore natural to replace the foreign coal by the "white coal" for those railways whose traffic and other conditions are well suited for electrification. The Norwegian government, therefore, has already started such electrification, and at present three sections of the state railways are electrically operated, and two additional sections are being electrified. The single-phase system at about 15 cycles and approximately 15,000 volts has been adopted. Also two privately owned railways are electrified. The following tabulation lists the railroads which are already electrified and those in progress of being electrified:

Electric Railways

1. "Thamshavn" railway. Privately owned. Length, 10 miles. Track gage 1.0 meter. Single-phase alternating current, 6,000 volts, 25 cycles.
2. "Tinnos" railway. Originally privately owned, now a State railway. Length, 18.7 miles, standard track gage. Single-phase alternating current, 10,000 volts, 16½ cycles.
3. "Rjukan" railway. Privately owned. Length, 10 miles, standard track gage. Single-phase, alternating current, 10,000 volts, 16½ cycles.
4. "Drammen" railway. Length, 33 miles of which 8.1 miles is double track. Standard track gage. Single-phase alternating current, 15,000 volts, 15 cycles.

5. "Ofot" railway. Length, 26 miles, standard track gage. Single-phase alternating current, 15,000 volts, 15 cycles.

The "Drammen" railway has a rather large passenger service, the other railways a rather large freight service.

Railways Which at Present Are in Progress of Electrification

6. "Hovedbanen" (Section Kristiania-Lilleström). Length, 13.7 miles, double track. Standard gage. Single-phase alternating current, 15,000 volts, 15 cycles.

7. Section: Dramen-Kongsberg. Length, 28.6 miles. This section is the continuation of the "Drammen" railway.

The above mentioned railways (1-5) are put down in the order in which they have been electrified.

Power Problems of the Swedish Railways

By I. Öfverholm

Chief Electrical Engineer, Swedish State Railways

At the present time only one link in the Swedish State railway system is electrified, namely, the Svartön-Riksgränsen line. This line, which is principally used for the export of ore from the iron mines at Kiruna and Gällivare to the harbors at Narvik and Svartön, has a length of 270 miles, to which should be added 16.7 miles of branch lines, which are also electrified. The connecting line through Norway from Riksgränsen to Narvik, which has a length of 26 miles, was electrified in 1923. The total electrified line Svartön-Riksgränsen-Narvik is thus 296 miles. It is therefore the longest electrified railway in Europe at the present time.

The section from Kiruna to Riksgränsen, 81 miles, was electrified in 1915; in 1920 the line Kiruna-Gällivare, 62 miles, was opened for electric service, and in 1922 the electrification was completed to the whole line down to Svartön. Single-phase current at 15 cycles and 16,000 volts is used for the contact wire. The entire line Svartön-Riksgränsen-Narvik is supplied from the Porjus hydro-electric station on the Isle Alv.

Private Lines

Of Swedish privately owned railways, the following are electrified. The table gives the length of system in miles and the year when electric operation began.

	System	Length	Year
Stockholm-Djursholm	d.c. 600 volts	9.3	1893
Helsingborg-Råå-Ramlösa	d.c. 600 volts	5	1906
Mellersta Östergötland	ac. 10,000 volts, 25 cycles	45	'08-'15
Stockholm-Saltsjöbaden	d.c. 1,200 volts	11.7	1913
Lund-Bjärred	a.c. 16,000 volts, 16½ cyc.	6.8	1916
Nordmark-Klarälven	a.c. 16,000 volts, 25 cycles	93	'21-'22

The Electrification of the State Line—Stockholm-Göteborg

The Stockholm-Göteborg line is a cross-country line in the southern part of Sweden with a length of 284 miles. Single-phase current at a frequency of 16½ and 16,000 volts on the trolley line will be used for this electrification.

The necessary electric energy will be taken from the state-owned system of main three-phase transmission lines, at substations near the railway line at Södertälje, Sköldinge, Hallsberg, Moholm and Alingås. For the Stockholm-Göteborg electrification 50 electric locomotives are ordered, which will be delivered in 1925. All the locomotives will be alike. The locomotives, however, will be made with two gear reductions and two speeds, one for passenger service and one for freight service. In passenger service the locomotives will haul trains weighing up to 500 tons, with speeds up to 56 miles an hour, and in freight service they will haul trains of up to 900 tons with speeds up to 44 miles an hour. From the beginning 10 locomotives will be allotted for passenger and 40 for freight service.

The Stockholm-Göteborg line will be completely electrified by the end of 1925.

Power Consumption

The power consumption for four of the electrified Swedish railway is given in kilowatt-hours per year in the table below:

	Svartön-Riksgränsen	Nordmark Klarälven	Mellersta Östergötland	Lund-Bjärred
1916	10,000,000	.....	740,000	103,000
1917	8,378,000	.....	639,000	159,000
1918	7,637,000	.....	593,000	153,000
1919	7,984,000	.....	659,000	160,000
1920	9,508,000	.....	675,000	167,000
1921	28,451,000	1,234,000	701,000	181,000
1922	36,943,000	2,229,000	785,000	175,000
1923	*41,158,000	2,463,000	800,000	177,000

* This includes 1,901,000 kilowatt-hours which were consumed by the Riksgränsen-Narvik electrification.

For the Stockholm-Göteborg electrification the power consumption is estimated at 50 million kilowatt-hours per year.

The Electrification of the Austrian Federal Railways

By Dr. Arthur Hruschka
Ministerialrat, Vienna

Thorough and long study by the Ministry of Railways in what was formerly Austria (which abounded in coal as well as in water power) showed that the wealth of coal admitted of economical electrification of Austrian railroads on heavy grades only. On the other hand, after the war, the coal mines being almost entirely lost, electrification became an immediate and urgent necessity, the natural stock of coal in Austria being reduced to 1.2 per cent, which could meet the country's full demand for only 20 years. The National Assembly on July 23, 1920, passed a law deciding upon the immediate electrification of not only all lines between Salzburg and Villach in the east and Swiss and the German frontiers in the west, but also of nearly all those of other trunk lines.

The principal reasons for electrification in Austria may be considered to be: (1) Political and economic independence of importation and price of coal; (2) economy of service, especially on lines with heavy grades (up to 3.1 per cent), and on places far from the coal importing centers; (3) increase of medium train speed on grades; (4) increase of capacity of transportation; (5) cleanliness and absence of smoke in tunnels; (6) employment of Austrian industry.

The following lines are going to be electrified (the heaviest grades in percentage are put in parentheses):

1. Innsbruck—Lindau (Buchs, St. Margarethen) or the Arlberg line; 147 miles, single track (3.14).
2. Salzburg-Wörgl; 119 miles, double track (2.3).
3. Schwarzenbach-St. Veit-Villach or the Tauern line; 73 miles, single and double track (2.8).
4. Steinach-Irdning-Attang-Puchheim or the Salzkammergut line; 62 miles single track (2.5). These lines, which are included in the first program amount to 389 miles and need 120,000,000 kilowatt-hours yearly.
5. Additional lines: Kufstein-Wörgl-Innsbruck-Brenner (formerly Southern Railway); 68 miles, single and double track (2.5).
6. A later program will include Vienna-Linz-Salzburg (1.1); Amstetten-St. Michael-Villach and Klagenfurt (1.8); St. Valentin-Klein Reisling (1.7); Hieflau-Vordernberg (7.1); Linz-Selztal-Bischofshofen (2.2); and Wels-Passau (6.6), giving a total of 669 miles.

Altogether they amount to 1,143 miles, requiring 330,000,000 kilowatt-hours a year. Probably the old Southern Railway line, Wien-Graz frontier (183 miles) and Bleiburg-Innichen near the Dolomites (141 miles) will follow, making a total of almost 1,430 miles.

Austria abounds in unexploited water power to such a degree that it was possible to examine 315 different sources. In the choice of system, the Federal Railways have followed the decisions in Switzerland and Germany, and will employ single-phase current at a frequency of 16½ cycles per second, with a medium voltage of 15,000 volts.

Notwithstanding all other advantages of electric service,

the realization of this first program will depend upon first cost and the price of coal.

Main Line Electrification on the State Railways in Germany

By Wilhelm Wechmann

Ministerialrat, Ministry of Transport and Railways, Berlin

The two districts in Bavaria are at present run separately, but when the lines now under construction going south and southwest from Munich are completed, the electrified system in Bavaria will reach a total line length of about 370 miles.

Electric operation of railways must equal steam operation as regards reliability and punctuality. To meet this condition the State Railway Department in Germany has made the necessary new equipment, including power stations, feeders, conductors and electric locomotives as simple as possible, and with the smallest number of parts. The State Railway Department in Germany has adopted single-phase alternating current with a frequency of $16\frac{2}{3}$ periods per second, and a line pressure in the trolley wire of 15,000 volts.

In the case of electric locomotives for the main lines of the State Railways in Germany it was possible to reduce the number of different types to six. There are now two types each for fast trains, passenger trains and freight trains, namely, one for hilly districts and one for flat level lines.

The following main lines have been electrified:

In Silesia, mountain railways.....	165 miles
In Central Germany, between Halle, Leipzig and Magdeburg	110 miles
In Bavaria, around Reichenhall and on the Mittenwald line	50 miles
Various shorter lines	35 miles
Total	360 miles

The power of the electric locomotive has been found to be superior to that of the steam locomotive. Output investigations have been confirmed by the results of test runs. The capacity of lines has been increased considerably by electric operation.

Electric operation is considered economically superior to steam operation and the savings effected compared with steam operation are sufficient to pay from 6.6 to 13.8 per cent interest on the capital expenditure for the electrical equipment and electric locomotives.

Electric Traction in Italy

By Professor F. Tajani

In northern Italy, where numerous three-phase traction lines exist, this system will continue to be adopted in the future; in central and southern Italy, where electric traction is in its infancy, the three-phase system and the direct current system will be tried.

The first three-phase current locomotives operating on the Valtellina lines, where grades do not exceed two per cent, were constructed for speeds of 20 and 40 miles an hour, the motors being coupled in series and parallel, respectively. Subsequently, owing to the electrification of the Giovi and Frejus lines with steep grades (about 3 per cent) and a large freight traffic, the above speeds were reduced to $15\frac{1}{2}$ and 31 miles an hour respectively.

The locomotives running on level roads are now usually provided with four economic speeds (23, 31, 47 and 62 m.p.h.) which are obtained in a fairly simple way by the above parallel and cascade connections, in addition to the pole commutation.

One interesting feature of three-phase locomotives is their low specific weight. Thus the most recent types may develop 2,000 kw., their weight being 75 metric tons only, distributed over five axles, a load exceeding 15 metric tons per axle not being permitted on our lines. The tractive effort

is limited to 26,500 lb. by the resistance of the couplings.

The economic results of electric traction have given rise to considerable discussion in Italy owing to the great difficulty of appreciating them. A comparison with steam traction has shown that, as a rule, the cost of fixed plants for electric traction is high, so that substitution will only prove profitable in the cases of lines with steep grades and a considerable amount of traffic in addition to a low cost of power. It is difficult to state the cost of plants under the present circumstances, as most of them were erected before the war. Fair average figures cannot be given, as the expenditure varies for each individual case, according to the type of line (double or single track), the number of stations relative to the length of the line and finally according to the number of tunnels, and the length of the main lines required. According to pre-war estimates, electrification was found to be profitable on those lines which only showed an average yearly consumption of 675 tons of coal per mile.

This formula, although the figures from which it was deduced differ greatly from the actual ones, may still hold if we consider that the cost of coal and that of plant increased simultaneously and almost at the same rate.

Electric traction has been applied also to 809 miles of tramways and to 321 miles of secondary railways. On the city tramways the general system used is the 500 volt d.c. system, on the secondary railways and on suburban light railways there are some examples of single-phase, which met with a limited success. Recently an important secondary railway has been electrified with d.c. 4,000 volts, and the results have been very satisfactory.

In conclusion, although opinions are still divided in Italy on the choice between three-phase and d.c. for the railways with heavy traffic, for the secondary railways and suburban services, the general opinion is that d.c. is the only possible system to be adopted.

Electrification of Railways in the Dutch East Indies

By Dr. G. de Gelder

Chief Engineer Electrical Department, D. E. I., State Railways (Java)

We may obtain through electrification, besides great improvements in the traction systems, a real economy for railways by reason of the continual and steady development being effected in the field of water power.

One might therefore say that the electrification of railways in general—not to mention all the other advantages—goes hand in hand with the growth of experience in the exploitation of water power, and that by reason of this, economy by electrification may even be attained under unfavorable circumstances, as, for instance, in the case of those lines which are not suffering from congestion of traffic or which do not specialize in comfort and speed.

This is especially the case in Java. Experience has taught us that the considerable saving of fuel obtained in many countries by electrifying the railways, can also be obtained by using thermal central stations, and while further savings in respect of the maintenance of rolling stock and tracks and those savings caused by abolishing many auxiliary services, such as water supply, etc., are independent of the problem of energy production, the greatest advantages are nevertheless only gained by the construction of water power central stations.

The exploitation of water power has these features—the costs of construction of a water power station are very high, two to four times as high as those of a steam plant. On the other hand, the running expenses are quite small. Only at a certain period of use of the installed capacity of the station will the cost of energy production exceed that of a steam plant.

During these last 10 years, however, it has become evident that in countries where no major industries exist, water power stations can be made a success by electrifying the railways. The unfavorable conditions with regard to the production of light and power prevailing in Java, owing to distances between the centers of consumption being very large, are compensated by the electrification of the railways. As a matter of fact, the transmission wires necessary for the railways serve to connect large centers of consumption with each other, or such centers as are a very small distance from the railroads.

Owing to this, electrical energy for all purposes is distributed at no great expense when the railways are electrified.

Should, therefore, the electrification of the railways be in itself less productive in consequence of the relatively small traffic compared with other countries, and should, owing to unfavorable conditions, the water power works not be a paying proposition without electrification, it is certain that, if both purposes are combined, an extremely favorable condition will be created for Java.

It has been decided for the present only to electrify the railways around Batavia, for example, the line Meester-Cornelis and Weltevreden to the port of Priok and the business center of Batavia, a kind of circle railway of about 31 miles length of headway and 56 miles length of track. The 1,500-volt direct current system will be used. The current is to be supplied by two water power stations, erected by the department of water power and electricity. The first is the Tjijatih station, now called Oebroeg, which gets water from the Tjijatih and some other streams. The second power station is the Tjianten station, now called Kratjak works. It lies 10.5 miles from Buitenzorg.

The Financial Aspects of Main Line Electrification

By Sir Philip Dawson

The benefits to be derived from the electrification of purely suburban systems are well known, and it is not proposed to deal with them specifically in this paper. The benefits to be derived from the electrification of complete sections of a railway are not realized in this country as much as they should be, and there is a popular belief that only where water power is available, or in the case of mountain lines, can the complete electrification of a railway system or of a considerable portion of it be justified. It is worth the object of disproving any such idea that the following paper has been prepared.

It is hardly necessary to say that as far as main line electrification is concerned, we have nothing to show, while on the continent of Europe, in South Africa, New Zealand, Japan, the United States and South America, very considerable progress has been made in this direction.

It is not only from the point of view of the railways or of the traveling public that electrification will be of immense advantage. Electrification on a large scale will largely conduce to an abundant and cheap supply of electricity not only to industrial areas, but also to many rural areas which otherwise would not obtain it.

It will in many cases enable coal to be utilized at or near the pit head, of a quality much of which now is more or less useless. It will largely reduce the smoke nuisance, and enable the railways to utilize for building purposes most valuable sites in the center of many of our large towns by covering in their stations and the railway tracks immediately adjoining them, as has been done in the case of the Pennsylvania and New York Central Terminal stations in New York.

The electrification of the whole of the lines in and out of Liverpool street station would enable buildings to be erected over all the lines inside and immediately outside that station,

thus rendering available for building purposes a site which has been valued at £5,000,000. There are many other similar cases to be found in Great Britain, where the value of the site which electrification renders suitable for building purposes, will largely cover the capital required for carrying out the electrification.*

Power for Transport—

Railroad Electrification

By Prof. Dugald C. Jackson
Massachusetts Institute of Technology

The large area of the United States, the relatively low density of population in most of the country, and the great distances between large cities and between areas of production and consumption have caused American railroads to develop differently from western European railroads; the direction of development in America having been for long hauls with notably heavy trains and powerful locomotives, associated with the utmost practicable utilization of track facilities. The electrification problems therefore are different.

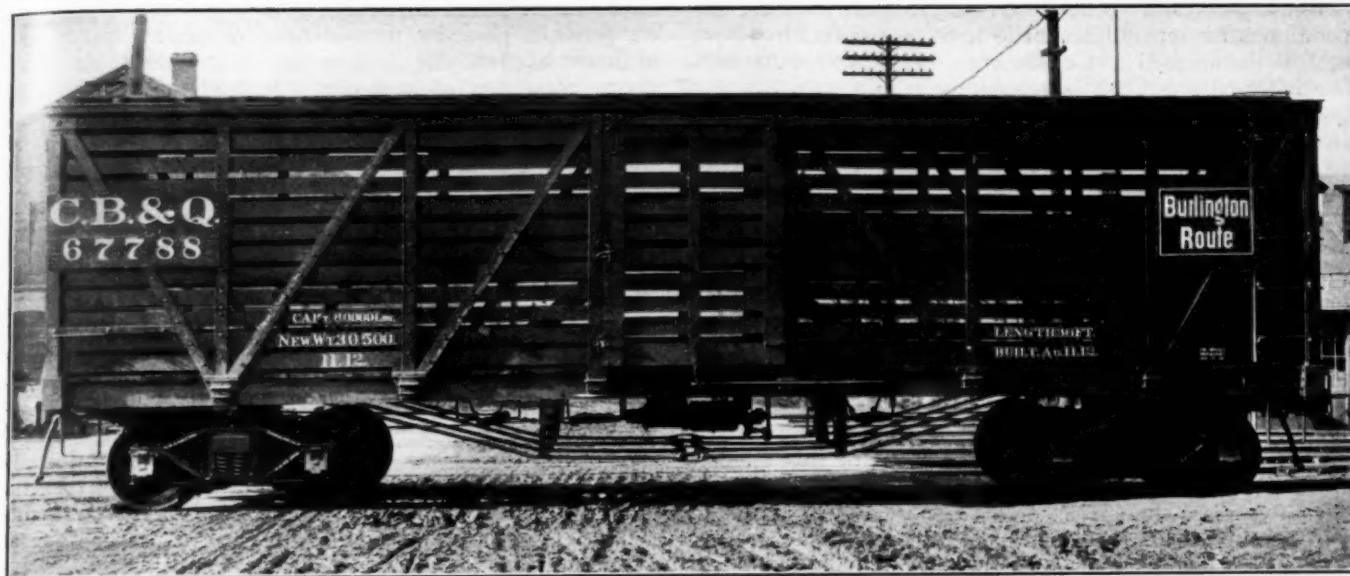
These conditions apply to Canada also, as well as to the United States.

Electrification offers opportunities in America for increasing capacity of permanent facilities beyond the limitations imposed by steam motive power even of the most modern types, and electric installations for railroad traction have slowly increased along a natural economic route, more particularly to relieve congestion at tunnels and at terminals and to handle heavy traffic over severe grades or to increase track capacity for general service on main line divisions, where the conditions had grown beyond the scope of improved steam motive power. This progress is contributing to the advantage alike of railroad patrons, the general public, and the railroads themselves. In these installations the electric motor has eminently proved its merit for the purpose, and the economies, increased capacity of trackage, acceleration of train movement, prevention of congestion, and other advantages from electrifications suitably installed have been demonstrated. Approximately 700,000,000 kilowatt-hours are now used per annum for hauling trains in the electrified zones.

The cramped financial condition of various principal railroads, caused by heavy taxation and agitation for lower freight charges, is preventing them from realizing the advantages of electrification in many additional situations where its installation would be serviceable. Nevertheless, the use of electrical power for railroad traction is steadily increasing and it will be greatly extended in the future. It is estimated in this paper that the prospective early electric power needs of the American railroads, for those zones of trackage that are approaching traffic saturation when using steam motive power of improved types, and which will secure relief by electrification, are of the magnitude of 5,000,000 kilowatts of generating capacity and an energy absorption per annum of 10,000,000,000 kilowatt-hours. While many railroads operating electrifications generate their own electrical power, the tendency is to interconnect with large existing power systems (whether steam, electric or hydro-electric) where such are available, for the purpose of purchasing power; thereby securing economy, dependability and flexibility in the power supply, and at the same time conserving expenditure of railroad capital in order that it may be reserved for investment in transportation plant *per se*.

The prospective power requirements thus estimated make a large individual aggregate, but the well developed American electrical power industry can readily meet the need.

* The greater part of Sir Philip's paper consists of the outline of a project for electrifying the London, Brighton & South Coast (now part of the Southern Railway) in England.



One of 1,200 Cars Built in 1912 with Creosoted Sills and Flooring. A Recent Inspection of these Cars Showed No Decay in Treated Timber After 12 Years Service

Treating Freight Car Timber Will Cut Repairs

Preservation of Lumber Will Add Equivalent of 100,000 Cars Through Reduced Delays

By H. S. Sackett
Consulting Timber Engineer, Chicago

THE SPLENDID record established by the railroads in the handling of freight during 1923, and thus far in 1924, was largely made possible by the addition of nearly 200,000 freight cars, or an increase in these facilities of approximately 10 per cent. The handling of the tremendous increase in traffic reflected credit on the entire railroad industry and fully warranted the unstinted praise generally accorded by shippers in all parts of the country. The direct result has been a most favorable psychological reaction among the general public that is exerting a quite noticeable restraining influence against adverse agitation.

The most effective defense against demagogery at the command of a public utility, is the application of practical efficiency to the utmost limit. If an example were needed to impress upon the mechanical departments of the railroads the desirability of employing every safeguard to keep rolling stock *out* of the shop, none better could be cited than the signal achievement of increasing by 10 per cent the capacity for freight transportation. It should be a spur to increased efforts in the employment of every practicable remedial measure that will lessen the causes for repairs, thereby materially augmenting the available supply of serviceable freight cars. The efficient utilization of the wood required for the construction and repair of freight cars will reduce one of the most frequent causes for "bad order" cars—the preventable decay of wood members. Applied to the limit of practicability, the preservative treatment of car lumber and timber will add to the serviceable equipment the equivalent of approximately 100,000 freight cars.

Economic Importance of Reduced Repair Time

Decay is the cause of most light repairs and of a large percentage of the heavy repairs to composite and all-wood freight cars. Considered from the standpoint of the individual

car this is, admittedly, a comparatively small detail, but applied to the nearly two and a half million freight cars in service, simple multiplication makes it a factor of tremendous importance. The accumulative influence of small factors, such as one additional mile per car per day, is brought forth very aptly by L. F. Loree, president of the Delaware & Hudson in his book Railroad Freight Transportation as follows:—

"The opportunities for improvement in car use and the consequent decrease in the number in stock may be roundly summarized in the following simple figures: (a) an increase of one ton in the average lading for each car would be the equivalent of making available 60,000 more cars, and, (b) an increase of one mile in the average mileage made per car per day would be the equivalent of making available 100,000 more cars."

Over a period of five years the average number of freight cars continually awaiting repairs was somewhat over 200,000, representing an average annual loss in time in excess of 70,000,000 cardays.

The average idle time for every car in service is about 30 days per year. The actual total loss, refined to a statement of the numerous individual items, cannot be determined—only a panoramic sketch can be presented which should suffice to urge the responsible executives to inaugurate a study of this problem in its relation to their respective conditions. On the basis of these general averages, however, the total cost of repairs may be estimated as closely approximating 10 per cent of the annual gross freight earnings per car.

Available records indicate that of the somewhat less than two and one-half million freight cars in service, about 70 per cent are of composite or all-wood construction. It is in these cars that this discussion centers. Preventable decay in wood members is the direct cause for over 80 per cent

of the repairs and approximately every four years the expenditures for repairs amount to from 20 per cent to 30 per cent of the original cost of the cars. In less than 20 years the individual car has been entirely rebuilt, but at a far greater cost than the original purchase price. The preservative treatment of the lumber and timbers will insure from 15 to 20 years life *without repairs*, with the exception of the 20 per cent that are due to mechanical causes.

Lest these statements be interpreted as favoring the all-steel type of car, let it be said that even under present conditions the cost of their maintenance is higher than that of the composite steel-underframe car, and especially under the conditions which exist in a majority of the railroad repair shops of the country. The latter type, constructed of treated lumber and timbers, will unquestionably prove far cheaper per year of service, and many roads will likewise find them lower in first cost.

The reader may here reflect that in all of this there is nothing particularly new. That is quite true. For more than five years the subject of the preservative treatment of car lumber has been given more or less intensive study. Voluminous data have been accumulated. Field studies in repair shops, laboratory and practical experiments in treatments and the employment of treated material have all been carried on. At least one major railroad, the Chicago Burlington & Quincy, has carried to a conclusion its practical experiments with stock-cars; the results of more than trebled life, without the limit having yet been reached, speak for themselves. Refrigerator cars that contain creosoted sills and sub-flooring have been in fresh meat service for years without complaint. The results have been so successful that anyone sufficiently interested to give careful study to the matter, must be impressed by the considerable volume of indubitable proof that it is entirely practicable to employ treated lumber and timbers in every type of freight car, and that there exists an entirely satisfactory process of treatment for every class of service.

Where creosoted members in sub-structure or framing may taint susceptible lading such as butter, eggs, etc., these parts may be treated with zinc chloride or with sodium fluoride. Preservative treatment is not synonymous with "creosoting," as other preservatives and treatments are equally available and valuable under conditions where their employment is particularly suitable. These are technical details which there is no room here to discuss at appropriate length, but as most of this information has been widely circulated, and is readily obtainable such repetition is not necessary.

The Value of Preservative Treatment of Car Timber Established

Several years ago those in charge of freight car construction and rehabilitation on 75 per cent of the major railroad systems of the country were provided with the data gathered by an investigating committee of the American Wood Preservers' Association, and have since had further opportunity of prosecuting the matter to a conclusion. But not one major railroad system has yet permanently adopted this method of reducing freight car idleness. What may be the reason? Has energy expended in investigations and experiments been dissipated in the subsequent protracted discussions of technic, specification, processes, shop practices, etc.? Or is the invisible barrier that condition of mind, not uncommon to certain elements of large quasi-public industries, which dislikes any innovation requiring readjustment of established custom? For nearly a century there has been no fundamental change in the physical preparation and employment of wood for freight cars. There have been modifications, such as larger and heavier members, the addition of steel draft-gear, steel underframes, steel framing in the superstructure, etc., but there has been no marked

improvement in the utilization of the timber. This neglect, or, perhaps, passivity to modern developments in the use of timber has probably been an important factor contributing to the popularity of steel cars. It has become more convenient to employ steel, but this convenience has been purchased at greater expense without aiding production of freight transportation. On the basis of ultimate economy, which should be the controlling consideration, no type of car is more serviceable or less costly to maintain than the composite type freight car in which treated wood has been employed.

An important corrective should be applied at the small junction repair tracks as well as at the largest shops in the manner of determining the cause for failure of parts, particularly of wood members. Almost universally the notations on records are "repairs due to break," or "due to mechanical failure," when a simple investigation would reveal that more than 75 per cent of the failures were primarily due to the development of decay, through which the sill, decking, roofing or post was so weakened as to result ultimately in mechanical failure. To remedy this condition at the source, to retard the development of decay, thereby equalizing the natural and mechanical life of the member, by proper preservative treatment, is the burden of this discussion.

The purpose of these criticisms is constructive,—to concentrate attention on the pecuniary advantages of employing treated timber in freight car construction and rehabilitation. It is not intended to lend undue importance to the conditions cited as obstacles that have thus far seemed to hold back the general practice of this very decided economy. In fact, there exists no really important obstacle. No radical changes in shop practices are involved and no difficulty need be experienced with labor. No large outlay of capital is required for machinery, plants or other equipment. The most important change, perhaps, is the desirability of standardizing parts, types of construction and sizes of lumber and timbers in order to reduce the volume of the stock of treated material it would be necessary to carry on hand, and to facilitate repairs to foreign cars. This could readily be adjusted to meet with universal satisfaction by the respective railroad organizations having these matters in charge.

Standardization of Details Will Facilitate Treatment of Car Material

There are three distinct divisions in the application of wood preservation to freight car construction and repair: first, new cars; second, the repair of company cars, and third, the repair of foreign cars. The first offers no special problems. It is only necessary to draw plans and specifications covering the manufacturing details of the respective parts, method of treatment or process, and preservative, in accordance with which the respective members may be ordered in large quantities from the treating plants, either by the railroads or the car-builders, and then assembled in the freight car. Here additional opportunities for savings are offered as there need be no chamfering or carpenter work in assembly if the design and manufacture of sills, posts, etc., has been properly carried out; thus, preservative treatment not only suggests but provides for the standardization of parts on a basis not now in vogue. The second division, the repair of company cars, requires somewhat more care, especially in determining at what point rehabilitation on a sufficient scale to justify replacement of a major portion of the wood members becomes advisable. Where a large number of cars undergo rebuilding at one time, the treated members can be ordered on a quantity basis, but where repairs are to be made on individual cars at outlying points, it is not deemed practical, at least for the present, to carry stocks of treated members for such repair work. In the third category fall the repairs to foreign cars and these offer

the most difficult problem. No railroad likes to put more money into the repair of foreign cars than is absolutely necessary, and unless the major parts and members of freight cars are standardized, so that practically every piece, bolt and part in every freight car is interchangeable, the present practice of "getting by" as cheaply as possible, fixing up the car to carry it off the line, will continue, little progress will be made in the use of treated lumber on foreign cars. This merely emphasizes the urgent need for the practical standardization of freight cars.

Every effort is necessary to cut costs in every department of railroading. Any step towards standardization which will achieve economies should receive universal support of utilization of materials. Every means that will eliminate waste must be furthered. It is quite conceivable that a large portion of the future railroad profits must be *saved out of the present wastes*. Dividends can frequently be found in the operating expenses if the search is made in earnest.

What Will Preservative Treatment Cost?

The added cost of treated timber can be estimated at from 15 per cent to 20 per cent of the original purchase price of the car. Thus, the only additional investment would be for the cost of treatment and preservative used, as it will not usually be practicable for railroads to add sufficient capacity to their treating plants, or to build new treating plants to take care of such additional requirements; in fact, it is usually more economical for railroads to purchase treated material from commercial treating plants, which are specialists in this work, than to attempt to compete with them. This comment is made with due respect to the fact that a few railroad treating plants operate at actual low cost due to an evenly distributed "load," normally at maximum capacity. Such exceptions, however, prove the rule that with all charges properly applied the average railroad treating plant cannot be expected to maintain as low production costs as properly managed commercial treating plants, even with the inclusion of a reasonable profit for the latter.

The details of the application of wood preservation to freight cars are completely available, both with regard to method, preservatives, specifications, etc. There is some one in the employ of every large railway system who has had opportunity to become technically familiar with this subject and in most railroad organizations there are specialists entirely capable of working out the necessary program with definite exactitude as applicable to the respective conditions. Zinc chloride, creosote oil, mixtures of creosote and tar, and other oils, all have their place and can be used to advantage and without fear of subsequent difficulties. Under circumstances where it is impracticable to adopt standards immediately for framing timber previous to treatment, etc., the application of creosote by surface treatments during construction at repair yards, is always available and worthwhile as a temporary measure, but not as a substitute for the standard pressure treatments. In brief, the use of preservative treatments for car lumber can be introduced immediately at every shop and repair track in the United States. There remains only the will to take the initiative. Increasing car capacity without adding to equipment or plant is the true essence of applied economics.

Tremendous Aggregate Savings Possible

The practice of preservative treatment of car lumber to the utmost limit of practicability provides tremendous savings in the aggregate. Considering savings in equipment, the treatment of car lumber will: (1) Reduce repairs sufficient to make available 100,000 additional freight cars; (2) Reduce car idleness annually by 35,000,000 car days; (3) Provide additional capacity sufficient to haul the entire average annual tonnage of agricultural products.

From the financial standpoint the treatment of car lumber

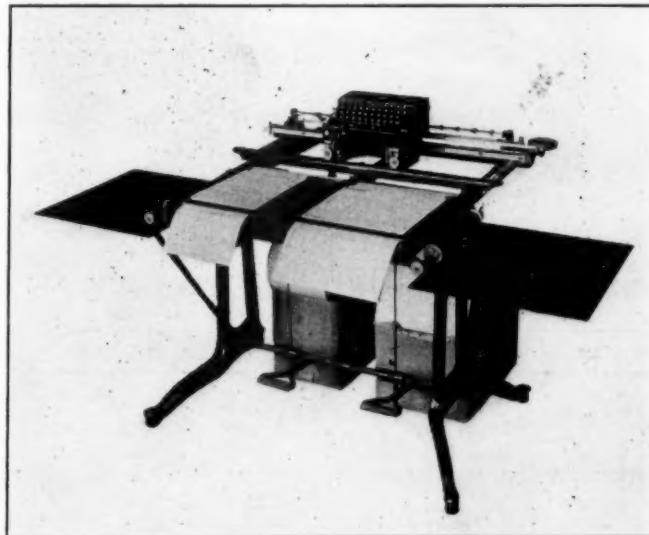
will save an amount sufficient to: (1) Purchase approximately 100,000 new freight cars of the composite type including treated lumber and timbers; (2) Pay about half the annual accrued interest on railroad indebtedness; (3) Equal nearly one-fourth of the average annual net operating revenues of the Class 1 roads for the last five years, and (4) after the rehabilitation of all cars of the types involved, it will reduce shop expenses for the repair of freight cars by more than 60 per cent.

It may be expected that the enumeration of these various points and the marshalling of these enormous potential savings, in contrast to the comparatively small detail of placing a few sticks of treated timber in a single freight car, may leave a reader in a skeptical frame of mind. There may be slight errors in some of these general calculations, but the basic facts are unalterable and, they are applicable to every railroad in the United States.

Accomplishment is dependent alone upon an intensive study of the subject as related to the individual system, to whose special conditions the proposals made must be adapted by men technically trained in the subject of wood preservation. If only a fraction of the savings herein held in prospect are realized—and there can be no question about that—the economy of the preservative treatment of car material is not only a desirable practice but an imperative necessity. There is no shorter cut to increased revenues than to increase the capacity to haul freight, and if wood preservation will aid in this, even to a limited degree, no adequate excuse can be adduced to justify further hesitancy in its application.

"Double-Barrel" Automatic Feed Record Writing Machine

THE ELLIOTT-FISHER COMPANY, New York, has recently placed on the market what it terms a double-barrel automatic feed record-writing machine. This machine is loaded with continuous length forms in multiples



Elliott-Fisher Double-Barrel Automatic Feed Record Writing Machine

of 1,000 and gives rapid production because the orders or bills are fed in continuous sheets, are drawn through interleaved carbon paper and can be instantly cut off when typed.

A similar machine with one flat platen or writing surface and adaptable to many types of forms has been on the market for some time, but the new device is a "double-barrel"

machine with twin platens, allowing debit bills to be handled on one side and credit bills on the other, or two records of different kinds to be handled simultaneously. But one writing head and one operator are necessary and the machine handles double set-ups on all types of continuous length forms.

It requires but ten minutes to load this machine with 2,000 sets, or from 4,000 to 12,000 separate forms and once loaded the operator has nothing to do but to write and tear off the forms. The carbon comes in 75 foot lengths. Once loaded, the machine illustrated will, it is claimed, keep the operator busy on non-waste production for from 10 to 15 days.

The new machine is expected to be of special value in railroad or commercial offices where the volume of work is sufficient to require two continuous length form or automatic feed writing machines. It is represented as probably being of particular value in such a connection as waybilling. At the present time local and interline waybills cannot, of course, be written on the same continuous length form writing machine as the local bills are different from the interline bills. With the double-barrel automatic feed machine, however, the same machine can be loaded with both local and interline waybills so that the operator can write both these types of records without having to move from her chair. The chief advantage of the device is said to be its "versatility" and the saving in production time which will effect marked economies in the preparation of such voluminous records as those handled by the railroads.

AN AEROPLANE, designed specially for carrying freight, was tested at Curtiss Field, N. Y., this week; a machine with two motors of 550 hp. each and with a wing spread of 86 ft. It is called the Remington-Burnelli. It weighs six tons in working order and will carry a load of three tons.



A Loop in the Alaska Railroad, Chugach Mountains

Shop Delivery Proving Economical*

By J. T. Clancy

District Storekeeper, Great Northern, Havre, Mont.

THAT STORE DELIVERY results in a large saving and has many advantages over the old system where mechanical employees come to the store counter for material as they require it, has been proven. The larger stores on this system have had store delivery for some time. The system which has been in effect at Havre, Mont., for 18 months consists of three laborers, one of whom devotes his entire time—or eight hours a day, and another six hours a day delivering to the shops, while the third devotes three hours a day delivering to the roundhouse and a truck driver spends one hour a day delivering to the roundhouse, and two hours to the service station, which is a mile from the storehouse.

The requisitions for the shops are first signed by the shop foreman who designates on the requisition the place where the material is required. All requisitions are collected by stores delivery men every 20 min. and taken to the store. Delivery is then made to the locomotive, bench or machine as specified on the requisition; the scrap being returned to the store on the return trip. Roundhouse requisitions for grease, waste, compound and oils are signed by the roundhouse foreman and left in his office. Delivery is made to the roundhouse oil house at 9 o'clock each day. Crude oil used for firing up engines is delivered to the shaving house. Brick and heavy material is delivered to the roundhouse on requisitions brought to the counter-man by roundhouse employees. Light material required by the roundhouse is delivered only when requested by the foreman. Requisitions from the service station, which is a mile from the storehouse and where there is a total of 24 men working, are first signed by the car foreman and sent to the storehouse. Delivery is made by tractor.

A comparison of the force required by the two systems of distribution follows:

<i>Shops—Old System of Handling</i>		
Average number of requisitions handled.....		115
115 trips to store per day @ 12 min. per trip.....		23 hours
23 hours mechanic helper @ \$0.51 hour.....		\$11.75 day
<i>Store Delivery</i>		
14 hours store laborer @ \$0.41 hour.....		5.75 day
Saving per day.....		\$6.00
Saving per year.....		\$1,800.00
<i>Roundhouse—Old System of handling</i>		
4 hours laborer @ \$0.38 hour.....		\$1.50 day
<i>Store delivery</i>		
1½ hours laborer @ \$0.41 hour.....		.60 day
½ hour tractor and driver @ \$1. hour.....		.50 day
Saving per day.....		\$1.10 day
Saving per year.....		\$40.00
<i>Service Station—Old System of Handling</i>		
2 car men and push car—12 hours @ \$0.51 hour.....		\$5.10 day
<i>Store delivery</i>		
2 hours Fordson tractor and driver @ \$1. hour.....		\$2.00
Saving per day.....		\$3.10
Saving per year.....		\$948.00
Annual saving made by installing stores delivery.....		\$2,870.40

In addition to the money saving, the shop delivery system keeps machines and mechanics working all the time, a better check of material is maintained, accounting of material has been improved, and material in stock is kept in better shape.

*Presented at First Annual Convention of Great Northern Stores Association, Great Falls, Mont., July, 1924.

General News Department

The car repair shops of the Baltimore & Ohio at Sandusky, Ohio, were reopened on August 18 after being closed since January 26.

Although W. G. Lee, president of the Brotherhood of Railroad Trainmen, has announced that the brotherhood will not officially endorse the candidacy of Senator LaFollette for president, Mr. Lee's own lodge at Cleveland, Ohio, has passed a resolution endorsing LaFollette and Wheeler and urging the members to work for the election of the Progressive ticket.

The order of the Interstate Commerce Commission permitting the Colorado & Southern to abandon its line between Buena Vista, Colo., and Romley, has been held up pending further investigation. The state of Colorado intervened with the claim that the road is an intrastate carrier and that the Interstate Commerce Commission is without jurisdiction. The hearing on the question will be held on September 11.

Railroads in Northern Illinois and Iowa suffered severely from the heavy rain storm that swept that region early this week. Bridges and track on nearly every road were washed out and traffic was tied up for periods varying from a few hours to a day and a half. The Chicago, Burlington & Quincy suffered considerable damage to its tracks in the vicinity of Peoria, Ill. The main lines of the Atchison, Topeka & Santa Fe and the Chicago, Rock Island & Pacific were also damaged at several points and trains were badly delayed.

Placards Emphasize Tax Payments

The Wrightsville & Tennille is displaying placards in the coaches of its trains operating between Tennille, Ga., and Hawkinsville, to impress upon its patrons the significance of the taxes paid by the railcad. The taxes paid during 1922 and 1923 are shown with a comparison between the two years. The taxes

**THE WRIGHTSVILLE & TENNILLE R. R. CO.
Paid Taxes**

1923 17.14
IN THE YEAR ~~1922~~ EQUIVALENT TO ~~1922~~ CENTS PER TRAIN MILE

TAX COST TO OPERATE THIS TRAIN

Between Tennille and Hawkinsville--Distance 75 Miles

\$12.85 \$11.88 PER TRIP,	\$771.00 \$766.88 PER MONTH,
\$25.70 \$23.98 PER DAY	\$9,252.00 \$8,102.88 PER YEAR.

paid were equivalent to 17.14 cents per train mile in 1923, compared with 15.57 cents per train mile in 1922. The tax cost to operate a train between Tennille and Hawkinsville, a distance of 75 miles, is shown to have been \$12.85 per trip in 1923, compared with \$11.68 in 1922.

Correction

In an editorial which appeared in the *Railway Age* of August 16, 1924 commenting on an article by L. L. Knight, entitled "Division Disbursement Accounting on S. A. L.", page 287, Mr. Knight's title was incorrectly given as auditor of disbursements, Seaboard Air Line. This title should have been given as general auditor and appears correctly in the signature of the article itself.

A New Kind of Crossing Accident

The following message, which was received by Michigan Central officers from a representative on the line, indicates that the railways have a new problem to contend with: "C. Wark in charge of U. S. Plane 508, Detroit, Mich., about 8:30 a. m. today, crashed into our wires at first road crossing west of Tillsonburg, breaking all wires down except two and also breaking pole. Linemen are repairing wires."

Should Have Been Milwaukee Instead of Burlington

The Chicago, Burlington & Quincy, through an unfortunate error in last week's issue of the *Railway Age*, was made the victim of some criticism that did not apply to it. The error occurred in the article appearing on page 293 entitled "Construction and Repair of Railway Equipment" and was caused by the unintentional omission of a subhead. The paragraph beginning with the last line at the bottom of the first column on page 293 and extending to the head "Philadelphia & Reading" in the middle of the first column on page 294 related not to the Burlington as would appear from the article but to another carrier, namely the Chicago, Milwaukee & St. Paul. The text thus described should have been headed "Chicago, Milwaukee & St. Paul" but the subhead which contained that name, although properly set on the galley proofs, was inadvertently lost when the article was made up in page form and the error was not detected until too late to correct it.

**"The Central of Georgia Makes Two Blades of
Grass Grow Where but One Grew Before"**

This is the heading of the latest newspaper advertisement of the road named. The advertisement, which, in this eight-point type would fill a column of the *Railway Age*, says, in part:

The Central of Georgia can qualify, under this proverbial standard, as a public benefactor; as having been helpful to its territory by its success in encouraging better pastures—a work that probably means more than anything heretofore attempted for the permanent prosperity of agriculture in this section.

TEST PASTURE work has been in progress for 4 years. Results for the past year are being made public in a series of meetings now being held in the 80 counties served by the road. Records show that these test pastures are grazing an average of more than a head of cattle to the acre, while even the blue grass section of Kentucky, it is estimated, requires two acres of pasture per head of grown cattle. Up to the present 2,421 farmers have started better pastures and have

started better pastures and have seeded over 31,000 acres. The movement is now firmly established.

The success of the pasture work in laying a foundation for cheap feed for live stock, as the basis of a stock-raising industry, has encouraged the road to inaugurate a new work; soil improvement through use of winter legumes, such as beans and peas, with which the agricultural colleges of Alabama and Georgia are getting favorable results. The Central of Georgia has offered to pay half the cost of establishing in each of 80 counties a soil test plot. One year hence the farmers will be invited to inspect the difference between the crops grown where the soil building methods have been used and those grown under ordinary practice.

The Central of Georgia maintains an Agricultural Department to study practical agriculture and its experience is placed at the disposal of farmers.

Freight Operating Statistics of Large Steam Roads—Selected Items for June, 1924,

	Average miles of road operated	Train-miles	Locomotive-miles		Car-miles		Ton-miles (thousands)			Average number of locomotives on line daily			
			Principal and helper	Light	Loaded (thousands)	Per cent loaded	Gross, Excluding locomotive and tender	Net, Revenue and non-revenue	Serv-ice-able	Un-serv-ice-able	Per cent unserv-iceable	Stored	
Region, road and year:													
New England Region:													
Boston & Albany.....	1924	394	243,057	260,419	27,689	4,617	65.6	242,893	92,305	125	19	13.0	...
	1923	394	313,723	333,998	32,854	5,862	64.6	321,709	130,056	117	25	17.7	...
Boston & Maine.....	1924	2,455	487,795	554,721	55,362	11,419	69.9	578,713	235,917	329	133	28.8	41
	1923	2,455	646,250	720,201	67,922	13,913	69.2	740,397	315,178	343	137	28.5	...
N. Y., New H. & Hartf....	1924	1,960	460,808	490,402	31,364	12,157	68.6	625,032	257,122	306	63	17.1	37
	1923	1,974	561,552	604,600	38,109	13,288	68.1	706,597	304,218	304	88	22.5	1
Great Lakes Region:													
Delaware & Hudson.....	1924	888	354,647	473,256	46,152	9,507	64.2	600,866	294,752	256	32	11.1	82
	1923	886	417,914	583,390	54,450	11,186	66.2	740,166	388,385	239	56	19.0	9
Del., Lack. & Western....	1924	993	497,766	586,174	76,546	15,652	67.3	875,979	393,395	306	58	15.9	36
	1923	993	543,098	659,476	102,536	16,929	68.0	948,724	439,738	289	66	18.6	4
Erie (inc. Chic. & Erie)....	1924	2,325	854,110	951,090	96,684	30,746	65.1	1,844,848	807,523	659	96	12.7	204
	1923	2,309	987,435	1,125,752	65,219	35,703	69.8	2,092,933	989,676	661	145	18.0	114
Lehigh Valley.....	1924	1,357	565,134	621,357	62,889	16,455	67.0	981,200	464,458	474	76	13.9	133
	1923	1,317	609,724	674,219	74,032	18,079	71.4	1,059,318	537,249	353	191	35.1	15
Michigan Central.....	1924	1,827	501,362	513,138	23,904	16,073	61.7	888,904	327,258	299	55	15.4	103
	1923	1,827	567,978	575,208	22,561	18,594	66.0	996,284	397,824	313	85	21.3	29
New York Central.....	1924	6,447	1,748,112	1,297,341	134,157	63,806	63.3	3,731,936	1,596,085	1,223	430	26.0	447
	1923	6,469	2,348,415	2,687,943	198,575	83,875	62.8	5,150,247	2,360,655	1,289	448	25.8	211
New York, Chic. & St. L....	1924	1,669	580,452	590,396	6,634	17,036	63.0	941,014	353,606	258	55	17.5	62
	1923	1,669	685,915	694,474	3,520	19,134	67.8	1,028,355	421,105	207	78	27.3	7
Pere Marquette.....	1924	2,227	338,469	349,156	10,375	8,382	65.0	469,337	212,024	189	21	10.0	33
	1923	2,190	387,547	397,593	8,824	9,797	68.6	558,972	255,699	169	45	20.9	4
Pitts. & Lake Erie.....	1924	231	103,102	106,615	1,255	3,445	63.7	265,357	157,279	67	21	24.0	18
	1923	231	183,972	192,604	1,122	6,825	65.6	504,377	303,126	72	18	19.9	1
Wabash.....	1924	2,459	551,388	575,888	7,789	17,332	66.9	955,906	391,727	306	51	14.2	46
	1923	2,418	601,105	630,936	7,606	17,888	70.7	942,340	391,219	249	88	26.1	..
Central Eastern Region:													
Baltimore & Ohio.....	1924	5,207	1,668,108	1,905,581	154,675	46,350	63.8	2,871,755	1,381,773	1,000	314	23.9	228
	1923	5,212	2,213,031	2,544,951	156,738	58,663	63.8	3,786,323	1,918,838	1,121	182	14.0	17
Central of New Jersey.....	1924	692	269,755	297,039	35,280	6,600	59.5	433,185	208,006	245	33	11.9	43
Chicago & Eastern Ill.....	1924	945	194,462	195,793	2,347	5,048	64.2	294,231	137,828	129	36	21.6	55
	1923	945	226,466	230,103	3,836	5,801	65.5	331,051	157,563	122	55	31.0	27
Clev., Cin., Chic. & St. L....	1924	2,379	609,957	640,567	9,305	18,154	60.3	1,146,131	530,513	315	121	27.9	44
	1923	2,377	684,469	722,433	9,196	21,723	63.5	1,349,140	643,552	336	102	23.3	35
Elgin, Joliet & Eastern ¹	1924	460	87,441	91,507	2,393	2,616	63.8	195,413	102,106	89	11	10.6	20
	1923	460	140,920	153,618	6,012	4,117	65.5	322,113	175,141	83	18	18.0	1
Long Island.....	1924	393	44,109	46,207	8,210	545	57.0	33,921	13,028	41	14	26.0	1
	1923	393	46,083	55,613	9,054	571	57.9	34,640	13,575	37	15	29.1	..
Pennsylvania System.....	1924	10,942	4,191,222	4,481,948	296,992	113,360	63.6	7,403,506	3,461,058	2,709	810	23.0	456
	1923	10,884	5,223,769	5,733,736	445,427	138,781	63.9	9,425,995	4,750,501	2,686	656	19.6	9
Reading.....	1924	1,141	600,865	657,799	63,719	14,404	61.5	974,986	496,081	415	77	15.7	123
	1923	1,142	687,486	766,083	84,969	17,247	66.2	1,159,074	623,482	363	96	21.0	52
Pocahontas Region:													
Chesapeake & Ohio.....	1924	2,558	964,355	1,032,941	35,542	29,232	57.8	2,307,461	1,248,863	440	95	17.7	26
	1923	2,553	856,899	935,476	20,291	28,153	61.0	2,044,240	1,141,634	443	74	14.3	15
Norfolk & Western.....	1924	2,231	764,348	938,560	28,613	22,917	61.0	1,797,102	932,925	574	106	15.6	172
	1923	2,227	866,360	1,090,930	38,303	25,056	60.6	1,968,654	1,062,847	541	163	23.1	50
Southern Region:													
Atlantic Coast Line.....	1924	4,865	773,764	782,118	12,818	18,425	60.0	1,003,709	380,575	395	51	11.4	53
	1923	4,860	755,669	760,636	11,967	18,207	65.8	957,481	394,471	320	97	23.2	11
Central of Georgia.....	1924	1,907	306,063	307,381	5,500	5,960	70.2	318,651	140,010	135	17	11.1	..
	1923	1,907	305,089	307,381	5,281	6,057	71.3	324,986	147,473	115	18	13.3	..
I. C. (inc. Y. & M. V.)....	1924	6,197	1,659,174	1,672,533	36,517	46,058	61.2	2,847,799	1,121,075	760	140	15.6	75
	1923	6,190	1,998,319	2,009,552	40,382	54,662	64.4	3,364,670	1,493,287	723	117	13.9	3
Louisville & Nashville....	1924	5,026	1,629,482	1,713,106	63,445	29,249	60.6	1,896,297	880,449	616	101	14.1	58
	1923	5,032	1,703,165	1,821,780	61,291	30,397	61.1	1,972,460	933,403	599	110	15.5	..
Seaboard Air Line.....	1924	3,547	508,544	517,226	9,793	11,192	61.7	622,668	230,608	238	32	11.7	8
	1923	3,553	451,993	459,862	10,985	10,413	69.0	539,049	220,843	201	53	20.9	2
Southern Ry.....	1924	6,820	1,317,690	1,345,175	30,102	29,265	63.9	1,644,759	653,830	862	115	11.8	24
	1923	6,942	1,554,033	1,596,594	35,394	33,423	66.1	1,833,539	789,715	789	135	14.6	..
Northwestern Region:													
Atch., Top. & S. Fe.....	1924	9,899	1,384,094	1,464,504	71,333	39,974	65.8	2,293,322	861,397	803	129	13.8	233
	1923	9,870	1,585,868	1,677,359	84,329	41,629	64.3	2,370,797	873,809	717	183	20.3	62
Chicago & Alton.....	1924	1,010	286,671	291,505	2,747	6,679	61.6	409,349	178,175	133	23	14.8	32
	1923	1,010	306,375	311,922	4,257	7,458	64.5	444,703	202,388	119	36	23.4	10
Chic., Burl. & Quincy....	1924	9,339	1,299,427	1,339,977	50,341	36,087	62.7	2,110,674	922,432	806	209	20.6	93
	1923	9,338	1,554,507	1,612,304	71,637	41,261	61.8	2,480,391	1,120,609	763	210	21.6	23
Chic., Rock I. & Pacific....	1924	7,595	1,447,457	1,467,444	13,11								

Compared with June, 1923, for Roads with Annual Operating Revenues above \$25,000,000.

Region, road and year	Average number of freight cars on line daily					Gross tons per train, excluding locomotive and tender	Net tons per train	Net ton- miles per loaded car	Net ton- miles per car-day	Car miles per car-day	Net ton- miles per road	Pounds of coal per 1,000 gross ton-miles including locomotive and tender	Locomo- tive miles per locomo- tive day								
	Per cent un- service- able																				
	Home	Foreign	Total	Per cent un- service- able	Stored																
New England Region:																					
Boston & Albany.....	1924	2,586	4,848	7,434	5.8	....	999	380	20.0	414	31.6	7,811	192	66.8						
	1923	1,840	7,350	9,190	3.2	....	1,025	414	22.2	472	32.9	11,005	181	86.0						
Boston & Maine.....	1924	14,992	14,295	29,287	11.8	....	1,186	484	20.7	269	18.6	3,203	148	43.9						
	1923	13,217	22,706	35,923	9.8	....	1,146	488	22.7	292	18.7	4,279	166	54.8						
N. Y., New H. & Hartf.....	1924	22,496	16,948	39,444	19.6	355	1,356	558	21.1	217	15.0	4,374	132	47.1							
	1923	19,363	26,380	45,743	16.1	....	1,258	542	22.9	222	14.2	5,137	160	54.7						
Great Lakes Region:																					
Delaware & Hudson.....	1924	9,791	6,142	15,933	5.9	....	1,694	831	31.0	617	31.0	11,065	174	60.2						
	1923	8,522	9,550	18,072	7.5	....	1,771	929	34.7	716	31.2	14,606	187	72.0						
Del., Lack. & Western.....	1924	18,658	7,353	26,011	3.5	1,244	1,760	790	25.1	504	29.8	13,212	156	60.7							
	1923	13,902	11,024	24,926	3.9	....	1,747	810	26.0	588	33.3	14,761	187	71.4						
Erie (inc. Chic. & Erie).....	1924	40,195	17,271	57,466	6.9	16,096	2,160	946	26.3	469	27.4	11,584	119	46.3							
	1923	24,931	28,115	53,046	10.4	....	2,120	1,002	27.7	622	32.1	14,285	125	49.3						
Lehigh Valley.....	1924	24,366	8,260	32,626	6.3	734	1,736	822	28.2	475	25.1	11,413	146	41.4							
	1923	20,793	15,691	36,484	5.7	48	1,737	881	29.7	491	23.1	13,599	164	45.9							
Michigan Central.....	1924	17,654	13,370	31,024	4.5	4,971	1,773	653	20.4	352	28.0	5,972	114	50.7							
	1923	10,757	20,030	30,787	8.1	....	1,754	700	21.4	431	30.5	7,260	114	50.1						
New York Central.....	1924	75,024	66,780	141,804	5.1	29,571	2,135	913	25.0	375	23.7	8,252	111	42.6							
	1923	58,319	97,734	156,053	9.5	....	2,193	1,005	28.1	504	28.5	12,165	115	55.4						
New York, Chic. & St. L.....	1924	13,145	9,913	23,060	5.3	3,748	1,621	609	20.8	511	39.1	7,064	113	63.7							
	1923	4,364	14,925	19,289	10.1	....	1,499	614	22.0	728	48.8	8,412	124	81.7						
Pere Marquette.....	1924	10,962	8,417	19,379	5.3	2,077	1,387	627	25.3	365	22.2	3,173	119	57.0							
	1923	7,552	17,383	24,935	4.2	....	1,442	660	26.1	342	19.1	3,892	122	63.5						
Pitts. & Lake Erie.....	1924	15,878	6,821	22,699	3.3	3,747	2,574	1,525	45.7	231	7.9	22,650	69	40.7							
	1923	8,705	14,412	23,117	13.7	....	2,742	1,648	44.4	437	15.0	43,701	72	72.2						
Wabash.....	1924	14,223	8,938	23,161	3.0	1,061	1,734	710	22.6	564	37.3	5,310	135	54.6							
	1923	9,356	12,279	21,635	3.2	334	1,568	651	21.9	603	39.0	5,394	138	63.2							
Central Eastern Region:																					
Baltimore & Ohio.....	1924	75,403	29,928	105,331	9.3	11,640	1,722	828	29.8	437	23.0	8,846	161	52.3							
	1923	52,897	51,200	104,097	4.3	....	1,711	867	32.7	614	29.4	12,272	170	69.1						
Central of New Jersey.....	1924	19,514	9,973	29,487	5.1	3,923	1,606	771	31.5	235	12.5	10,020	172	39.8							
	1923	12,283	14,894	27,177	10.7	....	1,569	780	31.7	278	13.8	10,876	179	43.7						
Chicago & Eastern Ill.....	1924	16,991	3,808	20,799	16.4	5,439	1,513	709	27.3	221	12.6	4,861	151	40.2							
	1923	12,081	4,993	17,074	19.9	....	1,462	696	27.2	308	17.3	5,557	179	44.0						
Cleve., Cin., Chic. & St. L.....	1924	17,686	16,772	34,458	6.2	4,022	1,879	870	29.2	513	29.1	7,433	117	49.7							
	1923	10,863	23,397	34,260	5.9	....	1,971	940	29.6	626	33.3	9,026	120	55.7						
Elgin, Joliet & Eastern ¹	1924	10,120	5,336	15,456	6.8	1,397	2,235	1,168	39.0	220	8.8	7,402	117	31.6							
	1923	8,463	8,516	16,979	9.2	....	2,286	1,243	42.5	344	12.3	12,699	106	52.8						
Long Island.....	1924	1,787	5,140	6,927	1.1	126	769	295	23.9	63	4.6	1,104	281	33.2							
	1923	1,463	5,720	7,183	2.4	....	752	295	23.8	63	4.6	1,151	404	41.1						
Pennsylvania System.....	1924	212,342	89,045	301,387	9.1	57,232	1,766	826	30.5	383	19.7	10,544	128	45.3							
	1923	159,950	120,492	280,442	4.3	1,554	1,804	909	34.2	565	25.8	14,550	138	61.6							
Reading.....	1924	25,263	12,860	38,123	3.2	5,028	1,623	826	34.4	434	20.5	14,497	166	48.8							
	1923	15,007	22,465	37,472	4.6	....	1,686	907	36.2	555	23.2	18,196	168	61.7						
Pocahontas Region:																					
Chesapeake & Ohio.....	1924	28,981	11,031	40,012	6.1	3,478	2,393	1,295	42.7	1,040	42.2	16,274	112	66.6							
	1923	29,330	17,613	46,943	6.2	....	2,386	1,332	40.6	811	32.8	14,906	115	61.6						
Norfolk & Western.....	1924	28,719	8,072	36,791	3.7	2,297	2,351	1,221	40.7	845	34.0	13,940	154	47.4							
	1923	26,106	13,833	39,939	5.2	....	2,272	1,227	42.4	887	34.5	15,906	173	53.4						
Southern Region:																					
Atlantic Coast Line.....	1924	20,908	11,765	32,673	5.1	....	1,207	492	20.7	388	31.3	2,608	120	59.4						
	1923	15,659	14,055	29,714	9.2	....	1,267	522	21.7	443	31.1	2,705	125	61.8						
Central of Georgia.....	1924	6,067	11,218	5.3	....	1,041	458	23.5	416	25.2	2,448	154	68.5							
	1923	2,588	6,811	9,399	5.9	....	1,065	483	24.3	523	30.1	2,578	166	79.0						
I. C. (inc. Y. & M. V.).....	1924	48,752	18,946	67,698	6.4	2,565	1,716	676	24.3	552	37.0	6,030	123	63.3							
	1923	34,496	33,770	68,266	6.7	2,012	1,684	747	27.3	729	41.5	8,041	132	81.4							
Louisville & Nashville.....	1924	43,688	16,456	60,144	10.9	107	1,164	540	30.1	486	26.7	5,839	155	82.6							
	1923	30,749	25,433	56,182	15.8	57	1,158	548	30.7	553	29.5	6,183	166	88.6							
Seaboard Air Line.....	1924	10,183	7,434	17,617	7.3	....	1,224	454	20.6	436	34.3	2,167	139	65.3						
	1923	10,218	10,162	20,380	25.1	....	1,193	489	21.2	361	24.7	2,072	152	61.7						
Southern Ry.....	1924	40,445	17,808	58,253	6.1	....	1,248	496	22.3	374	26.2	3,196	165	46.9						
	1923	27,563	31,109	58,672	8.2	....	1,180	508	23.6	449	28.7	3,792	190	58.8						
Northwestern Region:																					
Chic. & North Western.....	1924	50,087	23,797	73,884	9.6	....	1,320	540	23.1	331	22.8	2,900	143	44.6						
	1923	42,258	33,153	75,411	7.4	....	1,314	595	26.2	416	24.9	3,708	143	50.4						
Chic., Milw. & St. Paul.....	1924	56,123	19,998	76,121	6.2	....	1,571	684	24.2	393	24.8	2,722	138	42.8						
	1923	45,609	33,708	79,317	9.0	....	1,433													

Passenger Train Derailed by Truck

On August 21 a Reading express passenger train bound from Philadelphia to New York was derailed when it struck a motor truck at a highway crossing at Cranford, N. J., on the line of the Central of New Jersey over which the Reading has trackage rights to New York. Four persons were killed and ten injured.

A statement of the Central of New Jersey, issued shortly after the accident occurred and just as this issue of the *Railway Age* was going to press, follows:

"Train 604, Reading engine 346, was derailed at Lincoln avenue crossing, Cranford, about 9:30 this a. m., by striking an automobile truck which attempted to pass over the crossing while the warning signal bell was ringing, indicating the approach of the train. The view was clear, and the train could be seen for a long distance approaching the crossing."

"The engine, tender, combination car and first coach are lying partly on their sides; the other coach and parlor car, while derailed, are standing in almost an upright position."

"All (four main) tracks were blocked."

"Four persons were killed, only one of them being a passenger. The other three were the fireman on the engine and two men who were on the automobile truck."

"Ten persons were injured, but not seriously. Some of them were attended by physicians who were called to the scene of the wreck quickly after the accident, while several were sent to the hospital in ambulances."

"One track in each direction was opened up for traffic by 12:30 noon."

"The balance of the tracks will be opened up and wreck cleared during the afternoon."

**OPERATING REVENUES AND OPERATING EXPENSES OF CLASS I STEAM ROADS IN THE UNITED STATES
(For 194 Steam Roads, Including 16 Switching and Terminal Companies)**

FOR THE MONTH OF JUNE, 1924 AND 1923

Item	United States		Eastern District		Pocahontas Region		Southern Region		Western District	
	1924	1923	1924	1923	1924	1923	1924	1923	1924	1923
Average number of miles operated.....	235,994.26	235,695.97	59,510.41	59,311.07	5,461.87	5,448.51	38,334.63	38,449.34	132,687.35	132,487.05
Revenues:										
Freight	\$323,337,824	\$387,267,267	\$144,756,792	\$189,827,016	\$14,963,292	\$15,954,960	\$42,764,553	\$47,501,997	\$120,853,187	\$133,983,294
Passenger	495,969,550	b102,822,372	47,058,053	49,057,586	2,128,384	2,408,093	11,847,138	13,117,672	34,935,975	38,239,021
Mail	8,006,516	7,607,582	3,063,777	2,772,018	176,980	189,011	1,134,361	1,084,254	3,631,398	3,562,299
Express	11,713,602	13,163,946	5,383,603	5,844,462	278,636	289,432	1,415,514	1,754,300	4,635,849	5,275,752
All other transportation	15,851,407	17,489,977	9,140,782	10,615,831	183,357	186,447	894,102	911,169	5,633,166	5,776,530
Incidental	10,138,363	12,361,157	5,126,696	6,619,866	348,299	373,444	982,113	1,102,731	3,681,255	4,265,116
Joint facility—Cr.....	853,052	798,419	388,819	363,818	17,456	15,741	131,226	121,813	315,551	297,047
Joint facility—Dr.....	214,858	181,888	97,395	85,177	3,689	2,135	27,625	30,592	86,149	63,984
Ry. operating revs.	465,655,456	541,328,832	214,821,127	265,015,420	18,092,715	19,414,993	59,141,382	65,563,344	173,600,232	191,335,075
Expenses:										
Maintenance of way and structures	71,461,591	77,220,208	29,145,570	31,999,533	2,743,021	2,456,454	9,412,661	10,065,805	30,160,339	32,698,416
Maint. of equipment	99,173,282	124,460,548	47,002,780	62,330,930	4,362,541	5,015,557	12,844,277	14,956,825	34,963,684	42,157,236
Traffic	8,613,584	7,932,126	3,177,353	2,896,266	219,531	194,185	1,419,423	1,371,543	3,797,277	3,470,132
Transportation	167,878,224	189,751,818	79,787,473	93,011,533	5,486,431	6,124,900	21,768,380	23,945,359	60,835,940	66,670,026
Miscel'n's operations.....	4,285,175	4,466,697	2,024,835	2,147,865	82,911	83,521	375,793	401,093	1,801,636	1,834,218
General	13,962,108	13,878,194	6,228,941	6,168,155	480,364	426,984	1,811,538	1,798,858	5,441,265	5,484,197
Transportation for investment—Cr.....	1,200,259	961,301	164,426	126,559	28,887	20,963	208,099	107,186	798,847	706,593
Ry. operating exp's.	364,173,705	416,748,290	167,202,526	198,427,723	13,345,912	14,280,638	47,423,973	52,432,297	136,201,294	151,607,632
Net revenue from railway operations	101,481,751	124,580,542	47,618,601	66,587,697	4,746,803	5,134,355	11,717,409	13,131,047	37,398,938	39,727,443
Railway tax accruals.....	28,025,809	28,313,552	12,205,782	12,697,825	1,208,591	1,022,787	3,137,728	3,250,994	11,473,708	11,341,946
Uncollectible railway revenues	125,721	122,637	52,756	56,978	2,219	4,101	15,490	11,443	55,256	50,115
Ry. operating income	73,330,221	96,144,353	35,360,063	53,832,894	3,535,993	4,107,467	8,564,191	9,868,610	25,869,974	28,335,382
Equipment rents—Dr. balance	5,845,718	5,822,906	4,144,697	4,276,863	d311,571	d432,700	308,827	869,438	1,703,765	1,109,305
Joint facility rent—Dr. balance	1,955,536	2,048,727	1,027,192	991,058	108,408	213,355	168,296	148,108	651,640	696,206
Net railway operating income	65,528,967	88,272,720	30,188,174	48,564,973	3,739,156	4,326,812	8,087,068	8,851,064	23,514,569	26,529,871
Ratio of expenses to revenues (per cent).	78.21	76.99	77.83	74.87	73.76	73.55	80.19	79.97	78.46	79.24
FOR SIX MONTHS ENDED WITH JUNE, 1924 AND 1923										
Average number of miles operated	235,968.30	235,768.03	59,491.31	59,309.30	5,459.69	5,448.48	38,335.16	38,439.37	132,682.14	132,570.88
Revenues:										
Freight	\$2,068,494,911	\$2,271,672,266	\$945,453,517	\$1,086,921,884	\$93,714,602	\$91,815,497	\$288,674,843	\$303,735,528	\$740,651,949	\$789,199,357
Passenger	c529,010,131	e539,162,884	252,038,596	254,719,379	12,302,174	12,827,546	75,577,225	76,236,280	189,092,136	195,379,679
Mail	48,214,280	45,305,846	18,527,318	16,821,114	1,197,477	1,069,164	6,830,832	6,458,858	21,658,653	20,956,710
Express	70,767,913	77,422,229	31,545,545	36,595,485	1,598,177	1,786,580	10,235,747	9,651,548	27,388,444	29,388,616
All other transportation	93,919,557	97,932,441	54,301,497	57,967,750	1,078,408	1,092,685	5,395,451	5,599,642	33,144,201	33,272,364
Incidental	57,281,357	63,644,539	29,444,468	34,836,276	2,018,183	2,090,900	6,703,350	6,784,845	19,115,356	19,932,518
Joint facility—Cr.....	5,344,973	4,952,269	2,144,204	2,259,614	89,970	82,019	780,641	821,261	2,330,158	1,789,375
Joint facility—Dr.....	1,280,357	1,338,739	639,052	696,096	13,720	23,460	182,883	185,664	444,702	433,519
Ry. operating revs.	2,871,752,765	3,098,753,735	1,332,816,093	1,489,425,406	111,985,271	110,740,931	394,015,206	409,102,298	1,032,936,195	1,089,485,100
Expenses:										
Maintenance of way and structures	382,587,332	375,736,896	156,298,850	156,858,808	16,058,594	13,122,419	54,354,560	53,992,315	155,875,328	151,763,354
Maint. of equipment	642,214,924	731,312,010	309,443,315	365,114,422	27,828,460	28,583,307	80,465,147	86,179,171	224,478,002	251,435,110
Traffic	49,060,360	45,852,597	18,370,905	16,862,016	1,224,583	1,117,923	8,647,796	8,394,105	20,817,071	19,478,553
Transportation	1,097,321,235	1,192,126,965	526,429,871	584,723,169	36,014,861	37,443,377	145,386,384	152,194,560	389,490,119	417,765,859
Miscel'n's operations.....	24,444,398	24,468,355	11,786,648	12,140,478	519,088	504,018	2,594,374	2,414,097	9,544,288	9,409,762
General	84,598,220	80,504,851	37,496,921	35,886,600	2,628,895	2,411,413	10,944,619	10,530,679	33,527,785	31,676,159
Transportation for investment—Cr.....	6,393,549	4,381,627	993,235	441,369	152,346	74,883	816,536	583,367	4,431,432	3,282,008
Ry. operating exp's.	2,273,832,920	2,445,620,047	1,058,833,275	1,171,144,124	84,122,140	83,107,574	301,576,344	313,121,560	829,301,161	878,246,789
Net revenue from railway operations	597,919,845	653,133,688	273,982,818	318,821,282	27,863,131	27,633,357	92,438,862	95,980,738	203,635,034	211,238,311
Railway tax accruals.....	162,083,697	160,739,303	67,007,768	66,435,341	7,094,074	5,723,349	20,174,018	20,025,368	67,807,837	68,555,245
Uncollectible railway revenues	1,066,515	810,438	505,904	382,287	16,292	46,069	94,093	67,530	450,226	314,552
Ry. operating income	434,769,633	491,583,947	206,469,146	251,463,654	20,752,765	21,863,939	72,170,751	75,887,840	135,376,971	142,368,514
Equipment rents—Dr. balance	33,692,622	34,263,343	22,771,113	26,514,172	d1,854,892	d2,810,562	3,370,805	5,492,732	9,405,596	5,067,001
Joint facility rent—Dr. balance	10,093,154	10,473,418	4,902,175	5,277,889	611,353	684,116	584,861	478,820	3,994,765	4,032,593
Net railway operating income	390,983,857	446,847,186	178,795,858	219,671,593	21,996,304	23,990,385	68,215,085	69,916,288	121,976,610	133,268,920
Ratio of expenses to revenues (per cent).	79.18	78.92	79.44	78.63	75.12	75.05	76.54	76.54	80.29	80.61

a Includes \$3,387,128 sleeping and parlor car surcharge. b Includes \$3,366,596 sleeping and parlor car surcharge. c Includes \$17,687,704 sleeping and parlor car surcharge.

and parlor car surcharge. e Includes \$17,327,861 sleeping and parlor car surcharge and other reverse items.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Traffic News

The Atchison, Topeka & Santa Fe will spend \$1,000,000 in the fiscal year 1924-25 in advertising the attractions of travel to California.

The New York, Albany & Western Steamship Company has inaugurated a passenger and freight service between New York and Albany, N. Y. The fare for passengers for the 142-mile trip will be one dollar.

The Ohio Valley Shippers' Regional Advisory Board is to hold its fourth regular meeting at Hotel Shawnee, Springfield, Ohio, on September 16. The general secretary, F. M. Renshaw, Cincinnati, will distribute the docket ten days beforehand.

A "soil improvement special" is being sent through West Virginia by the Baltimore & Ohio. Soil experts on board the train test samples of soil brought by the farmers for its lime content. Those whose soil needs lime treatment are being given sufficient material to treat one acre of land.

The Union Pacific has issued a folder map of southern California which contains a complete descriptive account of the climate, agriculture, population, industries and tourists' attractions. The map is 18 in. by 32 in., is printed in colors and shows railroad and electric lines, cities, towns, lakes, streams, mountain ranges and other data. An insert also shows the states of California and Nevada. The map is being distributed as a part of the campaign to induce tourists to visit southern California.

In the first two weeks of August the Missouri-Pacific handled the largest volume of freight traffic in its history. On the lines of the company 47,384 cars were loaded and 17,132 cars were received from connections, making a total of 64,516 carloads. The total loadings for the first week exceeded the previous high record for a week's loading by 1,262 cars and the second week exceed the first by 56 cars. Twice during the two weeks, previous records for daily total loadings were broken, the first time on August 5 when 5,373 cars were loaded and the second time on August 12 when 5,396 cars were loaded. The daily average local loadings and receipts from connections totaling 5,376 cars exceeded the daily average for any previous period by 230 cars a day. The average daily movement of all cars on the Missouri-Pacific reached a new high record of 34.48 miles per car per day.

JEFFERSON SOUTHWESTERN.—Construction and operation of this company's projected line in Illinois was approved by the Interstate Commerce Commission with the submission to the commission of an option agreement whereby any two or more of the following companies shall have the option to purchase the property: Chicago & Eastern Illinois, Louisville & Nashville, Southern, Chicago, Burlington & Quincy, the Wabash, Chester & Quincy and any railroad company which may construct or acquire, during the period of the option, a line connecting with the Jefferson Southwestern, either directly or through a switching line, excepting a road which is industrially owned or controlled. Construction must be completed on or before July 1, 1925.

WENATCHEE SOUTHERN.—This company has been authorized to construct a line from Wenatchee to Beverley Junction, Washington, 53 miles; and from Hanford to a connection with the Oregon-Washington, about 5 miles west of Kennewick, 29 miles. The company proposes to operate trains under trackage rights over the Hanford branch of the Chicago, Milwaukee & St. Paul, between Beverley Junction and Hanford, approximately 46 miles, and over the tracks of the Oregon-Washington between Kennewick and the proposed junction 5 miles west. The project will provide a continuous line along the west side of the Columbia River from Wenatchee to Kennewick, about 132 miles. Its primary purpose is to provide additional facilities to move apples from the Wenatchee district. Construction must be commenced by January 1 next and completed Dec. 31, 1926.

Commission and Court News

Interstate Commerce Commission

The commission has found justified tariffs filed by the railroads proposing a reduction from 48 to 24 hours in the free time allowed in connection with team-track storage charges at Chicago on cars held for reconsignment, diversion or reshipment and on cars placed to complete loading or to partly unload. The tariffs were filed to become effective on May 1, largely for the purpose of making the free time provision in the track storage rules conform to the demurrage rules. They were suspended on protests by the Chicago Board of Trade and the Chicago Hay Exchange.

State Commissions

Chairman of Texas Commission Favors Motor Cars

Operation of gasoline motor cars on short line railroads in Texas may become general, according to Clarence E. Gilmore, chairman of the state railroad commission, who has made an investigation of the service and economic features of this method of transportation. He said:

"The possibilities of the gasoline motor car on our short lines and smaller railroads as a solution of the problem of service is very forcefully emphasized in a statement by W. Frank Knox, receiver of the Gulf, Texas & Western, of its passenger motor car operations for the year ending June 30. This line has operated a motor passenger car between Mineral Wells and Megargle and return each day from July 1 to September 19, last year, and from September 20, 1923, to June 30, 1924, Mineral Wells to Seymour and return daily. The first operation included a daily mileage of 168 miles and the present operation 216 miles daily.

"The total miles the car operated for the year amounted to 75,168, carrying 19,981 passengers. The total income from this car amounted to \$35,558.35. The total cost of operation, including labor, fuel, lubricating oil, station employees, depreciation, interest on the investment and insurance, amounted to \$13,003.33, leaving a total net profit for the year in the operation of the car \$22,555. The income per mile for the car was .473, and the cost of operation, including all the items named, was .173. It earned an average monthly profit, above all cost of operation and fixed charges except allocation of the upkeep of the track, of \$1,879.58.

"This line has within the past few months installed a freight package motor car service, the operation of which will be watched with interest. The operation of this car and many others of its kind is demonstrating the motor car as a solution for the shorter and smaller railroads."

Court News

Reasonable Care Required to Operate Crossing Bells

The New Jersey Court of Errors and Appeals holds that if a railroad maintains a crossing bell it must use reasonable care to see that it is operating, and evidence as to this is not confined to the question of contributory negligence.—*Rendino v. Davis* (N. J.) 122 Atl. 757.

Abandonment of Spur Track Denied

In an action of ejectment to recover possession of a spur track on the ground of abandonment, the Alabama Supreme Court held the defendant railroad entitled to an affirmative charge where the uncontradicted testimony showed that it was in possession of and had not discontinued operation of the track.—*Birmingham Sawmill Co. v. Southern*, 97 So. 78.

Taxation of Improvement on Right of Way

The Montana Supreme Court holds that improvements on a right of way are taxable under the Montana classification law of 1921 under class 4 covering "land, town and city lots, with improvements" at 30 per cent and not at 40 per cent

under class 7, covering all property not otherwise classified.—*State ex rel. Northern Pacific v. Duncan* (Mont.) 219 Pac. 638.

Superintendent of Refrigeration

Cannot Bind the Railroad

The Iowa Supreme Court holds that a railroad's superintendent of refrigeration has no implied authority to bind the railroad by an agreement with a shipper of fruit injured by negligence to pay the damages caused.—*Moon v. C. B. & Q.* (Iowa) 195 N. W. 106.

Total Failure to Deliver; Claims Must

Be Made Within Stipulated Time

The South Carolina Supreme Court holds that a loss by total failure to deliver is not a "loss due to delay or damage" within a provision of a bill of lading excepting claims for such losses from those which must be filed within six months after a reasonable time for delivery has elapsed.—*Allen v. Davis* (S. Car.) 118 S. E. 614.

Pennsylvania Stop, Look, Listen Rule

The Pennsylvania Supreme Court states the rule of law in that state to be that "where one about to drive a vehicle across a railroad at a crossing stops before entering upon the tracks and finds his view obstructed, he must alight and go forward to a point which affords a better outlook. Stopping where approaching danger is not noticeable is not an observance of his duty.—*Hoffman v. Pittsburgh & L. E.* (Pa.) 122 Atl. 274.

Payment of Freight Before

Delivery to Switching Line

The Virginia Supreme Court of Appeals holds that where the tariffs provide that carload shipments will not be delivered to a line which performs only switching services until transportation charges are paid, the carrier must require payment of such charges before delivery to avoid discrimination in favor of the consignee.—*McGuire v. A. C. L.* (Va.) 118 S. E. 225.

Safety at Highway Crossings

In a mandamus proceeding to compel a railroad to provide gates and gatemen at certain street crossings, the Minnesota Supreme Court held it error to strike from the railroad's answer averments to the effect that other less expensive devices were more effective, and that a viaduct in course of construction would divert from these crossings more than nine-tenths of the present traffic.—*City of Owatonna v. Chicago, R. I. & P.* (Minn.) 195 N. W. 452.

Private Siding—Runaway Cars—Collision

The Wisconsin Supreme Court holds that a railroad which is maintaining for a shipper a siding constructed partly at its own expense, the siding having a down grade of $1\frac{1}{4}$ mile and no derailing device to hold escaping cars, was liable for the death of a passenger in a train killed in a collision between that train and loaded freight cars which had escaped from the siding, the contention that the siding was a private track belonging to the shipper not being sustained.—*Arneberg v. Chicago, M. & St. P.* (Wis.) 195 N. W. 814.

Signed Receipt Stating Shipment

Is Short Is Not Notice of Claim

Although a claim for loss may be somewhat informal, the New York Appellate Division holds that it must furnish the railroad company with sufficient information as to the character of the claim and notice of intention to claim compensation for a suffered loss; and merely signing a receipt for a shipment of boxes, stating that the shipment was short one trunk, was not sufficient.—*Brewster v. Davis*, 207 App. Div. 461, 202 N. Y. Supp. 574.

Foreign Railway News

Railway Developments in Czechoslovakia

Considerable activity has developed in new railway construction in Czechoslovakia. The creation of Czechoslovakia as an independent economic unit resulted in the diversion of traffic from the previous routing and shortly after the year 1918 it was felt that considerable reorientation of the Czechoslovak railway system was necessary in order to meet the needs of the diverted traffic which prior to the disruption of the old Austrian monarchy gravitated mostly towards Vienna and Budapest—Prague, the actual capital of the Czechoslovak State, being behind these two centres as far as transportation facilities and their commercial demand are concerned.

The railway administration asked for the building of some important complementary sections of line in order to assure the efficient and economic operation of the whole system and a law passed on March 30, 1920, authorized the construction of 15 new lines of a total length of 412 miles. The importance of this new construction and the work actually done up to the present may be reviewed as follows: After the completion of this program, Czechoslovakia will have 8,737 miles of railways. The roads, however, are not adequate to the needs of some special sections of the country. South and Southeast Bohemia and Slovakia need some important complementary lines badly. Of the 412 miles of line authorized, 349 miles are in Slovakia. The year 1921 was spent mostly in preparatory work, the actual construction, all done by Czechoslovak contractors, having been started in the spring of 1922. By the end of the year 1924 about 87 miles of the lines authorized will be well advanced. The fact that the sections in question often cross very mountainous stretches of land and require extensive tunnel work accounts for some delay. The new construction is divided into about four groups: 1. Roads needed to improve connections between the provinces of Slovakia and Carpathian Russia where a shorter line is needed in the south and a longer new internal line from Preskov to Uzhorod to be lengthened later up to Jasina on the Polish frontier; 2. Roads to improve the unity of the system in internal Slovakia (about 7 short but difficult lines, among them one with a tunnel over 3,000 yards long, the longest in the country); 3. Considerable additions to lines are necessary to improve connections between the provinces of Moravia and Slovakia (5 lines, involving some shorter tunnels); and 4. Some complementary lines in the south and the southeast of Bohemia.

As far as operation is concerned not much new can be reported since the beginning of the year. Some two thousand new cars have been ordered this year by the railway administration, all of them with the home manufacturers, the car shortage being especially felt in passenger transport. The American train dispatching system is being actively studied by the railway administration and it is hoped that within a short time it will be introduced on some railway sections by way of experiment; other measures tending to lessen operating cost, such as reducing superfluous personnel, simplifying the service, reduction of the number of grade crossings, etc., are being pursued regularly and actively. On the other hand no progress can be reported so far with regard to the intended "private" operation of railways according to the famous law of December, 1922, called Rasin's, who then was the Minister of Finance. Under that law the operation of the state railways should have been organized according to the business principles of private commercial undertakings and the ministers of railways and finance have been entrusted with the carrying out of the law. From the beginning there had been some silent opposition against that law on the part of some employees and politicians and the thus far not very satisfactory experience with similar an operating arrangement in Austria (the "private" operation of railways was put into effect there in October, 1923), have considerably strengthened the adverse feeling towards the measure.

Considerable progress, however, can be reported with regard to the rate situation and the development of international railway connections. Internal, local railway rates were considerably reduced on March 1, 1924—about one-third—and economic activity in the country will undoubtedly be increased considerably by this important general reduction. The special freight rates accorded

to certain export industries also have been changed according to this revised local tariff. Arrangements for direct international car movement without unloading exist today with nearly all European countries and the Czechoslovak Railways are further rapidly making headway in establishing through tariffs in Central Europe. Since 1921 Czechoslovakia has had through railway tariff with Trieste and since 1923 similar arrangements have been made with Austria. At present negotiations are proceeding with the German railway administration in view of elaborating a through tariff between Czechoslovakia and the North German maritime ports (Hamburg, Bremen, Stettin)—a measure of highest practical importance to the Czechoslovak international trade and also for the American trade with Central Europe generally. It is a remarkable recognition for the Czechoslovak currency policy, that all these three tariffs have been set up in Czechoslovak crowns which proves the high confidence the interested railway administrations have in the stability of the Czechoslovak currency. In this way also on the field of her railway activity Czechoslovakia is working towards European economic stabilization and friendly international collaboration.

China Notes

PEKING.

The subject of bridges on the Peking-Hankow line is again receiving attention. It may be recalled that three years ago the Ministry of Communications employed an international commission of experts to go into the subject. The commission advised at that time that the Yellow river bridge might serve for some years to come, if speeds were reduced, but that several minor bridges ought to be renewed at an early date. The Ministry was already committed to a renewal of the large bridge, however, and tenders were opened but the experts disagreed in recommendations and nothing was done. Now tenders are to be called for concerning several minor bridges, Cooper E-50 standard, and ways and means are being discussed on how to finance the Yellow river bridge. The imposition of a bridge "arbitrary" on through traffic is being seriously considered, this "arbitrary" to be set aside to cover cost and interest on delayed payments. Gen. Wu Pei-fu is making an effort to have the new bridge located at Menghsien, some 37 miles further up the river than at the present location. The extension to the Taokow-Chinghua line, now under construction, reaches the river here, and a short spur would make a connection with the Lung-Hai line possible. From a transportation point of view, the alternative route across the Yellow river would be of value, and this location has been considered from time to time by the engineers of the railway. But the bridge at this point would have a much greater military value to Wu, as it would give him direct access to the provinces of Shansi, Shensi and the northern part of Honan.

The remission of the remainder of the Boxer indemnity by America and Russia and the favorable consideration which this subject is receiving in Japan, France and Great Britain has given rise to a very considerable sentiment in favor of using the funds for railway construction. Although education has been the favored subject in the minds of those fostering the return sentiment hitherto, a very considerable section of the Chinese intelligentsia take the position that education has become unbalanced in China. There is already a plethora of college trained men who have no opportunity to put into practice their professions for the reason that capital has not ventured to build railways, open mines or start the factories that work up the raw materials produced by mines or hauled by railways. While education is supposed to create an impression favorable to the nationality making the education possible, it is pointed out that understanding and commercial intercourse are bound to follow the rails laid down by any given nationality. Furthermore, the railway would be directly productive and the funds invested would therefore be perpetuated rather than disappearing from sight as in the case of education. Gen. Wu Pei-fu is probably the pioneer in the movement for the building of railways rather than the extension of education, and he argues that first of all order will follow the building of railways, after which will come commercial development, increasing purchasing power on the part of the people and with that the ability to finance their own education. The Ministries of Communications and of Foreign Affairs have given definite approval to the idea of devoting the Japanese and the British portions of the indemnity, when remitted, to this purpose, and have named the completion of the Canton-Hankow and the Hankow-Szechuan lines as the most necessary from a national standpoint. This will

be of interest to the large number of Americans who hold Hukuang railway bonds.

Beginning July 1, the Peking-Suiyuan line is operating sleeping cars on the express trains between Peking and Suiyuan. From Suiyuan to Paotou only day trains are run. A motor car service is being arranged from Paotou to Ninghsia and when the ballasting of the Suiyuan-Paotou section has been completed the sleeping cars will probably run through to Paotou.

The Peking-Suiyuan is now obtaining its cross-ties from the forests a short distance beyond Paotou. This is the first time any of the government railways have been able to meet their requirements from purely Chinese sources, the former Yalu pine having been under the jurisdiction of either a Russian or a Japanese company.

It has been decided that the Chinchow-Chaoyang branch of the Peking-Mukden line "outside the Wall" will be halted at the Pei-Piao mines, some twenty miles short of Chaoyang. The province of Chihli extends beyond the Great Wall for a very considerable distance, Chaoyang being on the furthestmost border. A Chihli garrison is stationed there. It is in an exposed position. From a military point of view it could be very easily "pinched off." The decision, therefore, to halt the construction of the railway evidences a definite decision on the part of Chang Tso-lin to avoid all possibility of provoking any cause for irritation between the two factions. The fact that a railway to Chaoyang would put Chang in a dominant position at the entrance of an important route to Peking, which position he now refuses to take, is a most encouraging sign of probable peace in north China for a considerable period.

In the settlement of outstanding questions arising out of the war, Germany has agreed to pay over to China the bonds of the Tientsin-Pukow and the Hukuang railways remaining in the possession of the Deutsche-Asiatische Bank at the close of the war. Funds on deposit with various banks for the payment of interest coupons on these bonds have been returned to China and amount to about \$8,000,000 at this time.

The Chinese Eastern Railway administration reports Revenues and Expenses for the railway proper for the year 1923, as follows:

Revenues	Rs. 35,681,515.64	Dec. Rs. 1,386,953.50
Expenses	26,036,266.21	Dec. 1,541,408.79
Net Rev.	Rs. 9,645,249.43	Dec. Rs. 154,455.29
Necessary deductions from net revenue will approximate the following:		
Improvements	Rs. 1,000,000	
Deficit on Ancillary institutions.....	3,000,000	
Transportation for Chinese authorities.....	1,250,000	
Supplies and advances to Chinese troops.....	3,000,000	
		Rs. 8,250,000

The firm of Skidelsky & Co., Harbin, has been awarded a contract for the construction of a railway from Harbin to Mergen, 300 miles with the approval of the governor of Heilungkiang province. The gauge is to be 5 ft., the same as the Chinese Eastern. The concessionaire will operate the line for twenty-eight years, paying thirty per cent of the net profits to the province, after which period the line becomes the property of the Chinese government without cost. For a considerable portion of the period the line will be principally a logging railway and probably not more than 125 miles will be built at first, even if no difficulties are encountered in financing construction.



Southern Pacific No. 20 Going on Tracks of the Western Pacific at Weso, Nev., at 7 A. M., August 1, 1924

This is the first Southern Pacific train to reach Western Pacific tracks in the daylight hours of that day. The W. P. and S. P. will henceforth use their tracks between Weso and Alazon, Nev., as a paired track.

Equipment and Supplies

Locomotives

THE ILLINOIS CENTRAL is inquiring for 25 Mountain type locomotives.

THE NORTHERN PACIFIC TERMINAL is inquiring for 1, 6-wheel switch engine.

THE GREEN BAY & WESTERN has purchased a 2-6-0 type locomotive from the American Locomotive Company.

THE ALABAMA & VICKSBURG has purchased 2 Mikado type locomotives from the Baldwin Locomotive Works.

THE SHAFER BROTHERS LOGGING COMPANY has purchased 1 Prairie type locomotive from the Baldwin Locomotive Works.

Freight Cars

THE ST. LOUIS SOUTHWESTERN is inquiring for 1,000 stock cars.

THE AMERICAN REFRIGERATOR TRANSIT COMPANY has awarded a contract to the Sheffield Car & Equipment Company for repairs to 700 cars.

THE ILLINOIS CENTRAL is inquiring for 4,000 gondola cars of 50 tons' capacity, 2,000 box cars of 40 tons' capacity, and 200 stock cars of 40 tons' capacity.

THE PENNSYLVANIA POWER & LIGHT COMPANY has ordered from the Clark Car Company four, 30-yd., extension-side dump cars for ash handling service at its Hauto, Pa., plant.

THE TEXAS & PACIFIC is inquiring for from 250 to 1,000 double-sheathed automobile box cars, from 250 to 1,000 single-sheathed automobile box cars and from 250 to 1,000 automobile cars.

THE MILL POWER SUPPLY COMPANY, reported in the *Railway Age* of August 9 as inquiring for 10 flat cars of 50 tons' capacity, has ordered this equipment from the Kilby Car & Foundry Company.

THE WESTERN FRUIT EXPRESS, reported in the *Railway Age* of August 2 as inquiring for 600 underframes, has ordered from the Bethlehem Steel Company 100 steel underframes for refrigerator cars. It is reported, but not confirmed, that the company has ordered 500 underframes from the American Car & Foundry Company.

Passenger Cars

THE WILMINGTON, BRUNSWICK & SOUTHERN has purchased a passenger motor car and trailer from the Edwards Railway Motor Car Company. The car and trailer have a combined seating capacity of 52 and a baggage compartment, 8 ft. by 18 ft.

THE ILLINOIS CENTRAL is inquiring for 200 express refrigerator cars.

THE GREAT NORTHERN has purchased 50 steel underframes for express refrigerator cars from the Siems-Stembel Company, St. Paul, Minn.

Iron and Steel

THE LOUISVILLE & NASHVILLE is reported to be inquiring for 3,000 tons of structural steel for bridges.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 250 tons of structural steel for an ice plant at Winslow, Ariz.

Machinery and Tools

THE GREAT NORTHERN is inquiring for one car wheel borer, one 18-in. lathe, one bolt cutter and one 44-in. boring and turning mill.

Track Specialties

THE NORFOLK & WESTERN is reported to have ordered 25,000 kegs of spikes from Jones & Laughlin Company.

THE GREAT NORTHERN, reported in the *Railway Age* of August 2 as inquiring for track specialties, has divided an order about equally for 5,000 tons of tie plates, 2,000 tons of splice bars, 10,000 kegs of spikes and 4,500 kegs of track bolts between the Bethlehem Steel Company, the Illinois Steel Company and the Inland Steel Company.

Signaling

THE EL PASO & SOUTH WESTERN will install the Bulla system of automatic train control and is now building the necessary equipment in its shops at El Paso, Texas.

THE MISSOURI, KANSAS & TEXAS has ordered from the Union Switch and Signal Company a 28-lever Saxby & Farmer interlocking machine for installation at Carrollton, Texas.

THE BALTIMORE & OHIO has ordered from the Hall Switch & Signal Company, Garwood, N. J., 18 position color light signals, some of them of the dwarf type. These signals are to be installed by the railroad company's forces at Hamler, Ohio.

THE MISSOURI-ILLINOIS RAILROAD COMPANY is to erect an interlocking plant at the intersection with the Louisville & Nashville near Nashville, Ill.; 19 working levers in a 24 lever frame. The materials are being furnished by the Union Switch & Signal Company.

THE RICHMOND, FREDERICKSBURG & POTOMAC has awarded a contract to the Union Switch & Signal Company for the installation of its two-speed continuous inductive automatic train control system on its line between Washington, D. C., and Richmond, Va., comprising approximately 100 miles of double-track line. A total of 66 locomotives are to be equipped for train control operation.



Freight Yard of the Atlantic Coast Line Railroad at Savannah, Georgia

In a period of twelve months, the Atlantic Coast Line received at Savannah, 358,381 barrels of rosin and 101,710 barrels of turpentine. The area of this yard is about 18 acres.

Supply Trade News

D. M. French, mechanical engineer of the **Gill Railway Supply Company**, with headquarters at Peoria, Ill., has been transferred to Chicago.

Gordon H. McCrae, manager of the London office of the **Independent Pneumatic Tool Company**, has been elected a vice-president of the company.

The Shelton Adjustable Double Deck Car Company has opened offices at 1019 Monadnock building, San Francisco, Calif., and will manufacture and sell an adjustable deck for freight cars.

R. L. Mead, engineer and salesman for the Brown Hoisting Machine Company, has been appointed western sales manager of the **Ohio Locomotive Crane Company**, with headquarters in the Railway Exchange building, Chicago.

The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, manufacturers of hollow and solid staybolts, has appointed the **Tabson Company** as its special representatives in Illinois, with offices in the Railway Exchange building, Chicago.

The Butler Railway Supply Company, 122 South Michigan avenue, Chicago, has been formed to manufacture and sell side bearings, trucks and truck parts. The incorporators of the company are **Vincent J. Burry, C. A. Woodman and O. S. Flath**.

The Commercial Asbestos Corporation has been incorporated at Huntington, Ind., to manufacture railway installations and other asbestos products. The incorporators are **E. W. Steinhart, Ft. Wayne, Ind., C. J. Higgins, Detroit, Mich., and R. J. Evans, Wabash, Ind.**

The Pawling & Harnischfeger Company, Milwaukee, Wis., has appointed **P. H. Sackett** to represent the company in Minnesota, North Dakota and South Dakota. Mr. Sackett's headquarters will be at 3445 Hennepin Avenue, Minneapolis, Minn., and he will handle all of the company's business in the territory stated above.

The Celotex Company, of Chicago, has closed a contract with the **American Refrigerator Transit Company** for the insulation of nearly 2,000 refrigerator cars with Celotex. It will require 3,500,000 ft. of Celotex to fill the order. Celotex is an artificial lumber product made from cane fibre and is lighter than ordinary insulating material.

Trade Publications

ENGINEERING DATA.—Considerable engineering data regarding the Maxi-mill in railroad work, the Bullard driving box borer and facer and the vertical turret lathe is contained in a loose-leaf booklet recently issued by the Bullard Machine Tool Company, Bridgeport, Conn.

REFERENCE BOOK.—The second edition of a 64-page, illustrated reference book of vertical turret lathe practice in railroad shops has been issued by the Bullard Machine Tool Company, Bridgeport, Conn. Installations from various shops throughout the United States are shown and, in most cases, diagrams indicate the tool equipment and operation layout. Specifications for the 24-in. and 36-in. turret lathes, the 44-in. Maxi-mill and the Bullard driving box borer and facer are also given.

A FIRE ON AUGUST 14 destroyed five tank cars filled with gasoline and oil and 13 carloads of merchandise, together with the Opequon bridge on the main line of the Baltimore & Ohio, near Martinsburg, W. Va. According to press dispatches, the fire followed the derailment of a freight train midway on the bridge.

Railway Construction

APPALACHIAN & WESTERN NORTH CAROLINA.—A special commission appointed by the governor of North Carolina, on behalf of this company, has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from Taylorsville, N. C., to Mountain City, Tenn., or between Taylorsville and Butler, Tenn., or between Doughton, N. C., and Mountain City, approximately 125 miles. The funds for the construction are to be advanced by the state in accordance with a law passed in 1923, for the purpose of providing a main trunk line across the state "to redeem the counties in northwestern North Carolina without railroad facilities, known as the 'lost provinces.'" Frank T. Miller, Greensboro, N. C., chief engineer.

ATCHISON, TOPEKA & SANTA FE.—This company closed bids on August 22 for the construction of a brick passenger station at Plattsburg, Mo.

ATCHISON, TOPEKA & SANTA FE.—This company, jointly with Contra Costa County, Cal., is constructing a subway at Franklin Canyon road near Christie, Cal., to cost approximately \$90,000.

ATCHISON, TOPEKA & SANTA FE.—This company has awarded a contract to F. M. Spencer & Son, Topeka, Kan., for the construction of a one-story shop building at Topeka, to cost approximately \$40,000.

CANADIAN NATIONAL.—This company closed bids on August 18 for the construction of a brick freight shed and offices at North Battleford, Sask., and a three stall brick addition to its roundhouse at Brandon, Sask.

CANADIAN NATIONAL.—This company has awarded contracts as follows for the grading of branch lines: Dunblane, Sask., to Dutton, to Mannix & Wickstrand, Winnipeg, Man.; Hanna, Alberta, to Worden to A. C. Bryson & Son and Boyds Ltd., Winnipeg; Loverna, Sask., and Teebles South branch to J. T. Hargrave & Co., Winnipeg.

CENTRAL OF GEORGIA.—Outside interests are planning the erection of an icing station somewhere on the lines of this company in Middle Georgia to cost approximately \$1,000,000.

CHICAGO & NORTH WESTERN.—This company will close bids on August 27 for the construction of a brick passenger station at Waukegan, Ill.

CHICAGO, ROCK ISLAND & PACIFIC.—This company has asked the Interstate Commerce Commission for authority to construct an extension of the proposed extension from Billings to Owens, Okla., pending in another proceeding. The projected extensions will constitute a continuous line from Billings, where the existing branch line now terminates, to Ponca City, Okla., the location of the Tonkawa oil field. The extension from Owens to Ponca City will be 20 miles in length.

CHICAGO UNION STATION.—This company closed bids on August 20 for the construction of train sheds for the new Union station in Chicago at a cost of approximately \$1,000,000.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—This company has awarded a contract to the Walsh Construction Company, Chicago, for the construction of a one-story battery works at Beach Grove, Ind., to cost \$30,000.

ILLINOIS CENTRAL.—This company is calling for bids for the construction of a 600-ton concrete coaling station at Dawson Springs, Ky.

MISSOURI PACIFIC.—This company has prepared plans for the construction of a branch line from Little Rock, Ark., to the Arkansas state fair grounds at an approximate cost of \$125,000.

NEW YORK, CHICAGO & ST. LOUIS.—This company has awarded a contract to the Erie Steel Construction Company, Erie, Pa., for the construction of an addition to its shops at Conneaut, Ohio.

SEABOARD AIR LINE.—This company has begun the construction of an industrial track, two miles in length, at Palmetto, Fla.

Railway Financial News

ALCOLA.—*Abandonment.*—The Interstate Commerce Commission has authorized the abandonment of the line from Olanta to Kirby Station, S. C., 4 miles.

ANN ARBOR.—*Bonds.*—This company has been authorized by the Interstate Commerce Commission to pledge with the director general \$450,000 of improvement and extension mortgage 30-year 6 per cent gold bonds as security for a demand note for \$337,000.

BALTIMORE & OHIO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority for the sale of \$75,000,000 of first mortgage 5 per cent bonds, which have been sold subject to the approval of the commission to Kuhn, Loeb & Co., and Speyer & Co., at 95½, and for the pledge as additional collateral under the mortgage of \$75,000,000 of prior lien bonds as and when acquired. The proceeds are to be used to acquire at or before maturity \$75,000,000 of prior lien bonds due July 1, 1925.

BOSTON & MAINE.—*Chairman of Executive Committee.*—Homer Loring was elected chairman of the executive committee on August 19. President James H. Hustis says that Mr. Loring will give particular attention to the financial affairs of the company. Mr. Hustis has been the acting chairman of the committee.

BUFFALO, ROCHESTER & PITTSBURGH.—*Bonds Sold.*—Dillon, Read & Co. have placed privately \$3,000,000 consolidated mortgage 4½ per cent bonds due 1957 at 87½ to yield more than 5.30 per cent. Proceeds are to retire \$2,000,000 5½ per cent and 6 per cent notes, and for additions and betterments.

BUFFALO, ROCHESTER & PITTSBURGH.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to sell \$3,000,000 consolidated mortgage 4½ per cent bonds, which it is proposed to sell to Dillon, Read & Co., at 85, the proceeds to be used to retire a government loan and a demand note and for other general purposes.

CHICAGO & ALTON.—*Abandonment.*—This company has requested authority from the Interstate Commerce Commission to abandon lease and operation of the line of the Rutland, Toluca & Northern extending from Rutland to Putnam, Ill., a distance of 32 miles. The deficit resulting to the Alton from operation of the line since 1910 amounts to \$500,000.

CHICAGO, ROCK ISLAND & PACIFIC.—*Sale of Leased Line.*—See Keokuk & Des Moines.

CUBA RAILROAD.—*New Director.*—Guy W. Currier, of Boston, Mass., has been elected a director.

DENVER & RIO GRANDE WESTERN.—*Sale of Property.*—Final decision on the upset price to be fixed by the United States District Court for the sale of the Denver & Rio Grande Western will not be made until after September 1, according to a statement by the court. Fixing of the price has been delayed by a petition filed early in August by Harold Palmer of New York, who sought to intervene in the hearing to determine the price.

GRAND TRUNK PACIFIC.—*Debenture Interest.*—As the result of a decision by the legal branch of the Department of Railways and Canals at Ottawa, Canada, the holders in England of Grand Trunk Pacific debentures will receive an interest payment of 4 per cent instead of 1 per cent as originally anticipated. That payment will be made at once. There are about \$34,879,252 of these securities outstanding and the interest on them will amount to \$1,395,170.

GREAT NORTHERN.—*Equipment Trust.*—The Interstate Commerce Commission has authorized an issue of \$4,500,000 of equipment trust certificates to be sold at not less than 96.

GULF, COLORADO & SANTA FE.—*Acquisition.*—This company has asked authority from the Interstate Commerce Commission to acquire control by lease of the line of the Pecos & Northern Texas between Coleman and Sweetwater, Texas, 81 miles in length, and

of the lines of the Concho, San Saba & Llano, extending from Miles Junction to Paint Rock, Texas, a distance of 16 miles; and from San Angelo to Sterling City, 43 miles. The lines sought to be acquired now are operated by the Gulf, Colorado & Santa Fe.

GULF, MOBILE & NORTHERN.—*Annual Report.*—The annual report for the year ended December 31, 1923, shows a surplus of \$940,497 as compared with \$782,988 in 1922. A selection of the principal items in the income account follows:

	1923	1922	Increase or decrease
Average miles of road operated.....	466	469	-3
Freight revenue	\$5,192,875	\$4,117,478	\$1,075,397
Passenger revenue	515,544	449,248	66,296
Total operating revenues	5,944,549	4,768,047	1,176,502
Maintenance of way and structures	907,224	687,747	219,477
Maintenance of equipment	1,020,982	768,996	251,986
Traffic	212,990	171,718	41,271
Transportation	2,110,081	1,653,992	456,089
General	211,659	188,649	23,010
Total operating expenses	4,459,952	3,460,922	999,030
Net operating revenues	1,484,597	1,307,124	177,472
Railway tax accruals	326,644	303,782	22,862
Total net operating revenues	1,157,797	1,000,588	157,209
Net operating income	955,307	844,752	110,555
Total non-operating income	144,290	69,036	75,254
Gross income	1,099,597	913,788	185,809
Total deductions from income	159,101	130,801	28,300
Surplus	940,497	782,988	157,509

KEOKUK & DES MOINES.—*Sale.*—At a foreclosure sale at Des Moines, Iowa, on August 19, this railway was bought by a committee of bondholders for \$1,250,000. The sale was a step in the reorganization plan of the company. The line is leased to the Chicago, Rock Island & Pacific.

LOUISIANA RAILWAY & NAVIGATION COMPANY OF TEXAS.—*Asks Rehearing.*—This company has requested from the Interstate Commerce Commission a rehearing on its application to issue \$147,500 of stock and \$2,963,000 of bonds in payment for the property formerly comprising the Sherman, Shreveport & Southern. The company was authorized by the Commission on June 20 last to issue \$400,000 of common stock and \$750,000 of first mortgage 6 per cent bonds, the Commission refusing to approve a capitalization in excess of \$1,150,000. The company represented in its application for rehearing that the action of the Commission in not authorizing the issuance of the full amount of securities requested was arbitrary, unreasonable and discriminatory, depriving William Edenborn, the present owner, of the free disposition and sale of his property, and the company of its liberty to make contracts for the acquisition of property in pursuit of its lawful and legal purposes.

MISSOURI-KANSAS-TEXAS.—*Interest.*—The directors have authorized the payment of interest due October 1, 1924, at the rate of 5 per cent per annum for the six months ending June 30, 1924, on its adjustment mortgage bonds.

NEW YORK CENTRAL.—*Abandonment of Branch.*—This company has applied to the Interstate Commerce Commission for permission to abandon the Mahopac Falls branch of the Putnam division. The branch extends from the main line at Baldwin Place 2 miles to Mahopac Falls, Putnam county, New York.

OHIO & KENTUCKY.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report as of June 30, 1917, placing the final value for rate-making purposes of the property used at \$817,068 and of the property owned as \$632,000. The outstanding capitalization as of valuation date was \$761,250 and the book investment in road and equipment was \$811,073 which the report readjusts to \$487,100. The cost of reproduction new of the used property is reported as \$966,758 and the cost of reproduction less depreciation as \$776,300.

PANHANDLE & SANTA FE.—*Acquisition.*—This company has requested authority from the Interstate Commerce Commission to acquire control under lease of the Pecos & Northern Texas, excepting the line between Coleman and Sweetwater, Texas, which the Gulf, Colorado & Santa Fe has applied for authority to control under a similar lease.

PENNSYLVANIA.—*Bonds.*—The Interstate Commerce Commission has authorized the Northern Central to issue \$8,300,000 of general and refunding mortgage 5 per cent gold bonds, the Pittsburgh, Youngstown & Ashtabula to issue \$2,000,000 first general mortgage 5 per cent bonds, and the Connecting Railway to issue

\$1,545,000 of first mortgage 5 per cent bonds, all to be delivered to the Pennsylvania at par in partial settlement for expenditures. The Pennsylvania was also authorized to guarantee the bonds and to sell them at not less than 99 to reimburse its treasury.

STANLEY, MERRILL & PHILLIPS.—*Abandonment.*—This company has been authorized by the Interstate Commerce Commission to abandon, as to interstate and foreign commerce that part of its line, 16 miles in length from Stanley to Polley, Wis. The remainder of applicant's line, extending from Polley to Vallee, a distance of about 22 miles is operated by the Soo. The line to Polley has produced very little traffic since logging ceased in 1910.

TEXAS MIDLAND.—*Final Valuation.*—The Interstate Commerce Commission has issued a supplemental report on the valuation of this company's property in which it finds that the final single sum stated in the tentative valuation issued on June 11, 1921 fairly represents the value for rate-making purposes, as of June 30, 1914, of the property owned and used by the carrier and devoted by it to common-carrier service, except for a reduction of \$16,851 in the amount to be included for working capital. The Commission accordingly finds that the value for rate-making purposes was \$3,080,000. The figures of the tentative report for cost of reproduction new are reduced by \$9,356 and those for cost of reproduction less depreciation are reduced by \$6,389 because of the determination, heretofore announced, to exclude from the inventory of the carrier's property certain telegraph property included therein when the estimate of cost of reproduction was formerly made, but no change on this account is made in the figure for final value.

UNION PACIFIC.—*Chairman of Finance Committee.*—Charles B. Seger, president of the United States Rubber Company and formerly president of the Union Pacific, has been elected chairman of the finance committee of the Union Pacific to succeed Charles A. Peabody, who has resigned on account of his numerous other duties. Mr. Peabody will continue as a member of the committee.

Dividends Declared

St. Louis Southwestern.—Preferred, 1½ per cent, quarterly, payable September 30 to holders of record September 6.
 Southern Pacific.—1½ per cent, quarterly, payable October 1 to holders of record August 29.
 Union Pacific.—Common, 2½ per cent, quarterly; preferred, 2 per cent; both payable October 1 to holders of record September 2.

Trend of Railway Stock and Bond Prices

	Aug. 19	Last Week	Last Year
Average price of 20 representative railway stocks	72.56	71.75	59.73
Average price of 20 representative railway bonds	88.55	88.69	82.60

DINING CAR MENU FOR THE LITTLE FOLK



WHEN little Folk a-travelling go
There's one important thing to know
About a dining car:—
The Line whose printed menus tell
What hungry girls and boys love well,
AND THAT'S THE C.N.R.!

Front Cover of 8-Page Booklet of Jingles Printed in Three Colors, on Two Pages of Which Is Printed Special Children's Menu for the Dining Cars of the Canadian National

Railway Officers

Executive

R. B. Van Horne has been elected a vice-president of the Cuba Railroad.

J. J. Henry has been appointed general agent of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala. Mr. Henry will report directly to the president.

C. R. McDonald, assistant to the executive vice-president of the Missouri-Kansas-Texas, with headquarters at St. Louis, Mo., has been promoted to assistant to the president, with the same headquarters, a newly created position.

Paul Sippel, assistant to the president of the Louisiana Railway & Navigation Company, with headquarters at Shreveport, La., has been elected vice-president, with the same headquarters, succeeding W. C. Morse, who has resigned. **E. A. Staman** has been appointed assistant to the president, succeeding Mr. Sippel.

Financial, Legal and Accounting

W. N. Key has been appointed special counsel of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala. In addition to his duties as special counsel, Mr. Key will have jurisdiction over personal injury and live stock claims.

Operating

James Sullivan, assistant trainmaster of the Peru division of the Wabash, has been appointed trainmaster of the Toledo & Western, with headquarters at Sylvania, Ohio.

J. D. Scott, acting assistant trainmaster of the Monongahela division of the Pennsylvania, with headquarters at Youngwood, Pa., has been appointed assistant trainmaster of that division. **J. L. Musser**, acting assistant trainmaster of the Monongahela division, with headquarters at Shire Oaks, Pa., has also been appointed assistant trainmaster, with the same headquarters.

E. Thwaites, whose promotion to general superintendent of the Third district of the New York Central, with headquarters at Cleveland, Ohio, was reported in the *Railway Age* of August 16, entered rail-

way service in May, 1888, at Cleveland, in the operating department of the Lake Shore & Michigan Southern, now a part of the New York Central. He held various positions in the operating department until June, 1907, when he was appointed freight agent at Cleveland, Ohio. Mr. Thwaites was promoted to assistant superintendent of the Michigan division, with headquarters at Toledo, Ohio, in November, 1910, and in December, 1912, he was promoted to superintendent of the Michigan division, with the same headquarters. He was transferred to the Cleveland division, with headquarters at Cleveland, Ohio, on November 1, 1917, and remained in that position until his recent promotion to general superintendent of the Third district.



E. Thwaites

W. Hickey has been appointed inspector of transportation of the Missouri Pacific, with headquarters at St. Louis, Mo.

E. C. Blanchard, whose retirement as general manager of the Northern Pacific, lines west of Paradise, Mont., was reported in the *Railway Age* of August 9, was born on July 29, 1854, at Wapello, Iowa. He entered railway service in 1873 as an agent and operator on the Burlington, Cedar Rapids & Northern, now a part of the Chicago, Rock Island & Pacific, and subsequently served in a similar capacity on the Union Pacific. He was appointed train dispatcher on the Northern Pacific in 1883, and two years later was promoted to chief train dispatcher. Mr. Blanchard was promoted to division superintendent in 1897, and held that position until 1909, when he was promoted to general superintendent of the eastern district. He was promoted to assistant general manager of the lines west of Paradise, Mont., in April, 1912, and in December, 1921, was promoted to general manager. He held this position until his retirement.



E. C. Blanchard

Arthur V. Brown, whose promotion to general manager of the Northern Pacific, lines west of Paradise, Mont., was reported in the *Railway Age* of August 9, was born on June 5, 1866, at Hannibal, Mo.

He entered railway service in June, 1884, as a clerk and stenographer in the freight department of the Missouri-Kansas-Texas. A year later he was transferred to the operating department and in 1887 entered the service of the Missouri Pacific as a stenographer in the office of the general superintendent. Mr. Brown was appointed maintenance of way clerk and storekeeper on the St. Louis, Iron Mountain & Southern, now a part of the Missouri Pacific, in January, 1888, and in April



A. V. Brown

of the following year, was appointed a clerk in the operating department of the Chicago, Burlington & Quincy. He was promoted to chief clerk in January, 1891, and in June, 1892, was promoted to secretary to the general superintendent. He was promoted to chief clerk to the general manager in April, 1897, and held this position until January, 1903, when he was promoted to assistant division superintendent. Mr. Brown was promoted to superintendent of terminals in August, 1904, and in December of the following year, was promoted to division superintendent. He was appointed general manager of the Missouri & North Arkansas in April, 1908, and served in this capacity until November, 1909, when he entered the service of the Northern Pacific as division superintendent. Mr. Brown was promoted to general superintendent of the Central district in May, 1914, and in November, 1920, he was transferred to the Western district. He was promoted to acting general manager of the lines west of Paradise in April, 1922, and held that position until his recent promotion to general manager.

Edward T. M. Carr, whose promotion to superintendent of the New Jersey Southern division of the Central of New Jersey, with headquarters at Long Branch, N. J., was announced in the *Railway Age* of July 26, was born on January 23, 1870, at Manchester (now Lakehurst), N. J., and received his education in the public schools of that place. He entered railway service in May, 1882, as a messenger for the New Jersey Southern (now a part of the Central of New Jersey) and later became a telegraph operator at Manchester and a number of other places on the New Jersey Southern division. On March 5, 1888, he was appointed a night train dispatcher on the same division, with headquarters at East Long Branch, N. J., and was appointed chief dispatcher on July 18, 1896. Mr. Carr became trainmaster on October 13, 1911, and on July 16, 1918, he became passenger trainmaster of the Central division, with headquarters at Jersey City, N. J., the position he held at the time of his promotion to superintendent of the New Jersey Southern division.



E. T. M. Carr

Traffic
C. W. Thacker has been appointed commercial agent for the Erie, with headquarters at Peoria, Ill.

F. O. Stafford, general freight and passenger agent of the Rutland, with headquarters at Rutland, Vt., has been appointed assistant freight traffic manager of the New York Central, lines west of Buffalo, with headquarters at Chicago, a newly created position.

Purchasing and Stores

Elmo Edwards has been appointed purchasing agent and general storekeeper of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., succeeding Paul McKay, who has resigned to accept service with another company.

Obituary

James R. Campbell, receiver of the Cumberland Railroad, with headquarters at Artemus, Ky., died at a hospital in that city on August 15, at the age of 57.

Dr. Charles N. Needham, assistant chief surgeon of the Denver & Rio Grande Western, with headquarters at Denver, Colo., died in that city on August 15.

Edward Ford, assistant to the president of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, whose death on August 13 was reported in the *Railway Age* of August 16, was born in July, 1862, at Kingston, Canada. After graduating from the Royal Military College of Canada, he entered railway service in July, 1881, in the construction department of the Canadian Pacific. He was promoted to assistant supervisor in 1883 and shortly afterwards was appointed a supervisor on the Pennsylvania. Mr. Ford was appointed roadmaster on the Central of Georgia in 1888 and four years later was appointed superintendent of the Florida Central & Peninsula. In 1895 he was appointed engineer of the Panama Railroad where he served until 1898, when he entered the service of the Alabama & Vicksburg as division superintendent. Mr. Ford was promoted to assistant of the president in 1907. He was also elected president of the Arkansas & Louisiana Missouri in December, 1915, which position he held until June, 1920, when he resumed his duties as assistant to the president of the Alabama & Vicksburg. Mr. Ford remained in the latter position until his death.